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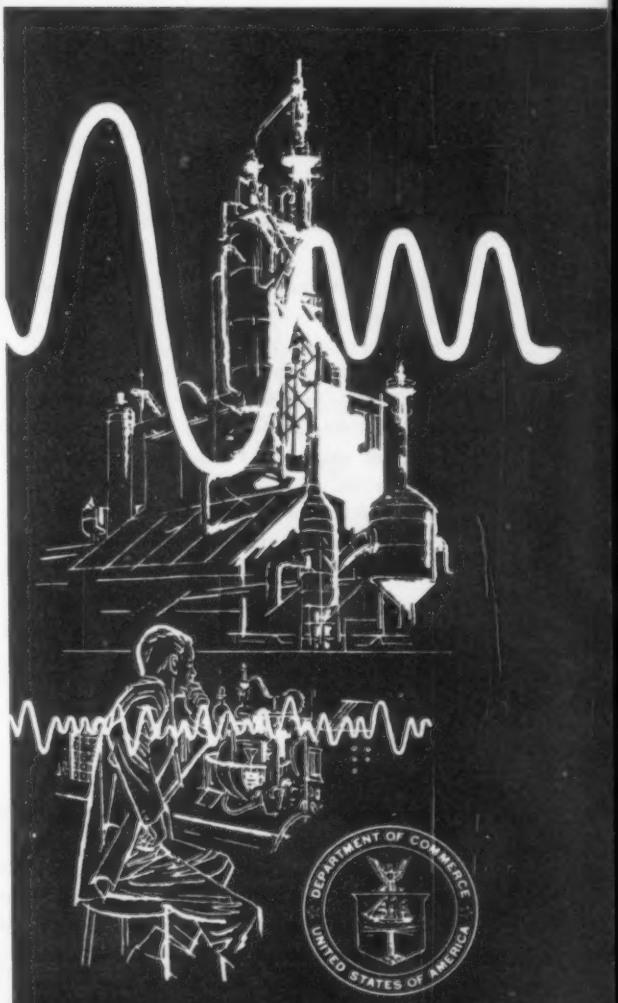

U. S. DEPARTMENT OF COMMERCE
BUSINESS AND DEFENSE SERVICES ADMINISTRATION
Office of Technical Services

U.S. GOVERNMENT RESEARCH REPORTS

U.S. DEPARTMENT OF COMMERCE
Luther H. Hodges, *Secretary*

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AD 263100 - AD 263899

TECHNICAL ABSTRACT BULLETIN

1. AIRCRAFT AND FLIGHT EQUIPMENT

AD-263 143 Div. 1
(TIPSB/MS) OTS price $5.60

Naval Ordnance Test Station, China Lake, Calif.
ENVIRONMENTAL TESTS OF ROCKET CATAPULT MK 1 MOD 0 (AIRCRAFT EJECTION SEAT),
by Howard Schafer. Mar 61, 54p. incl. illus. tables (NOTS TP 2638)
(NAVWEPS rept. no. 7631)
Unclassified report

DESCRIPTORS: (*Ejection seats, Catapults, Rockets, Temperature, Desert tests, Ejection, Firing mechanisms, Heat.)

A series of cockpit environmental tests was conducted on two models of a rocket catapult used for pilot ejection to check temperature parameters. Catapults were installed in aircraft with major results reported on the temperature environment within the cockpits of two A4D aircraft placed on the desert in two different Southern California locations. A severe high temperature was obtained by keeping the cockpits locked and sealed during the entire test period, which included the hottest part of the summer. The report includes 30 graphs. Weather parameters are touched upon, as they tended to increase maximum cockpit temperatures. Vertical temperature gradients on the rocket catapult are discussed. (Author)

AD-263 305 Div. 1, 31
(TIPSB/MS) OTS price $1.10

Aeronautical Materials Lab., Naval Air Material Center, Philadelphia, Pa.
INVESTIGATION OF MK IV PNEUMATIC LIFE RAFT - THE GARRETT CORPORATION, AIR CRUISERS DIVISION, BELMAR, N. J.,
by R. J. Carroll. 9 Sep 60, 2p. (Rept. no. NAMC-ANL-22089-61)
Unclassified report

DESCRIPTORS: (*Pneumatic life rafts, Design, Acceptability.)

AD-263 408 Div. 1
(TIPSE/NTM) OTS price $11.50

Air Force Flight Test Center, Edwards Air Force Base, Calif.
H-43B MODIFIED EMPENNAGE EVALUATION,
by Kenneth R. Ferrell and Jimmie S. Honaker. May 61, 148p. incl. illus. (Addendum 1 to AFFTC TR 60-21, AD-249 824)
Unclassified report

DESCRIPTORS: (*Helicopters, *Tails, Flight testing.) (Stability, Control, Rotor blades, Helicopter blades, Handling, Pitch, Stabilizers, Vibration.)

Results are presented of a limited comparative evaluation of rotor blade-to-tail clearance and stability and control of the original production H-43B and one of modified empennage with the vertical stabilizers lowered 14 inches and equipped with 10 inch frangible fiberglas tips. The modified empennage was developed to correct rotor blade-to-tail interference which resulted in an aircraft grounding and suspension of testing. The modified empennage configuration on the H-43B provided increased blade to vertical tail clearance and made the possibility of interference very remote. Flying qualities of this helicopter with the modified empennage were acceptable for service use with the directional stability augmentation system (DSAS) operative at the optimum setting utilized during this test program. Without the DSAS functioning properly, the H-43B with the modified empennage should not be flown except for flight test or pilot familiarization with an instructor pilot aboard. Vibration levels during high speed flight and longitudinal stability (static and dynamic) were improved with the modified empennage configuration, however, several undesirable stability and control characteristics still existed. Despite the stability and control deficiencies, the performance capabilities of the H-43B represent a significant improvement in USAF helicopter rescue capabilities at high altitudes. (Author)

AD-263 411 Div. 1
(TIPSE/WAW) OTS price $10.10

Air Force Flight Test Center, Edwards Air Force Base, Calif.
T-38A CATEGORY II STABILITY AND CONTROL TESTS,
by William A. Lusby, Jr. and Norris J. Hanks. Aug 61, 124p. incl. illus. (AFFTC-TR 61-15)
Unclassified report

DESCRIPTORS: (*Jet training planes, Training planes, Jet planes, Supersonic planes, Flight testing.) (Flight testing, Take-off, Stability, Stability (Longitudinal), Stability (Lateral), Control, Maneuverability, Stalling, Spin, Airplane landings.) (Flaps, Turbojet engines, Failure (Mechanics), Cockpits, Effectiveness.) (Flight instruments, Airspeed indicators, Calibration.)

The T-38 aircraft is an excellent trainer for pilot transition into high performance jet aircraft including present Century Series fighter aircraft. Its simplicity is conducive to transition; its performance and handling characteristics allow Century Series simulation and development of correct pilot techniques. The stability and control characteristics of the aircraft are satisfactory throughout the flight envelope. The longitudinal control response is sensitive at high speeds and/or Mach numbers and slow at airspeeds below 220 knots IAS, but it is the best balance available from the simple non-q-biased flight control system. The aircraft is safe to fly with or without stability augmentation. The damper systems provide adequate damping at all airspeeds and slightly excessive damping longitudinally at low airspeeds. All in-flight directional, lateral-directional, and lateral characteristics are satisfactory. The low nose wheel steering response near neutral requires excessive rudder pedal movements while taxiing and occasionally causes a low frequency divergence in directional oscillations on take-off due to over-control. (Author)

Division 1- AIRCRAFT AND FLIGHT EQUIPMENT

AD-263 413 Div. 1
(TIPSE/NTM) OTS price $9.10

Air Force Flight Test Center, Edwards Air Force Base, Calif.
YHU-1B CATEGORY I PERFORMANCE, STABILITY AND CONTROL TESTS,
by John F. Westphal and Paul J. Balfe.
July 61, 97p. incl. illus. (AFFTC TR 61-39)
Unclassified report

DESCRIPTORS: (*Helicopters, *Stability, *Control, Flight testing, Vibration, Reliability, Range.) (Pitch, Helicopter rotors, Yaw, Cockpits.)

The YHU-1B was tested by the Air Force Flight Test Center to gather limited performance and stability and control data to determine whether the helicopter will meet performance guarantees and to insure that no serious stability and control problems exist. The flying qualities of the YHU-1B were very good. In general, the flying qualities were improved over the earlier HU-1 series. This improvement stemmed primarily from the absence of the objectionable pitch and roll oscillations which were present in the HU-1. Control sensitivities were approximately equal, with a small decrease in pitch sensitivity being apparent in the YHU-1B. Control response of the two aircraft was approximately equal in pitch and roll, but the HU-1 developed a slightly greater yaw rate. Static and dynamic stability of the YHU-1B was generally good. The helicopter met all requirements for range, hovering, cruise speed, and service ceiling. (Author)

AD-263 431 Div. 1, 9
(TIPSE/WAW) OTS price $6.60

North American Aviation, Inc., Columbus, Ohio.
CANARD DROGUE DEPRESSOR.
Final rept.
14 Feb 61, 64p. incl. illus. (Rept. no. NA 61H-100)
(Contract NOw 60-0318-f)
Unclassified report

DESCRIPTORS: *Refueling in flight, Aircraft equipment, *Canard configuration, Design, Model tests, Flight testing, Mathematical analysis, *Aerodynamics, Stability.)

The design and development of an in-flight refueling drogue aerodynamic depression system is described. Results of dynamically similar model and full scale wind tunnel tests, actual flight evaluations, and analytical investigations of the system stability characteristics are discussed. (Author)

AD-263 542 Div. 1
(TIPSE/NTM) OTS price $11.50

Sikorsky Aircraft, Stratford, Conn.
HIGH PERFORMANCE SINGLE ROTOR HELICOPTER STUDY.
Final rept.,
by Evan A. Fradenburgh. Apr 61, 154p. incl. illus. (Rept. no. SER-50174)
(Contract DA 44-177-tc-648)
(TREC TR 61-44) Unclassified report

DESCRIPTORS: (*Helicopters, *Helicopter rotors, Helicopter blades, Short take-off planes, Vertical take-off planes, Design.) (Drag, Quality control, Stability, Control, Vibration, Elevators, Tests, Aerodynamics, Range, Turbojet engines.)

The basic high performance helicopter (HPH) will cruise at 175 knots with a payload of 2 tons. Maximum speed with this payload is 182 knots, and the aircraft is capable of a maximum speed without payload of 195 knots (224 mph). Minimum design ferry range capability was set at 1600 nautical miles, but a value in excess of 2000 nautical miles was achieved with a vertical take-off. Higher speed and payload capabilities were achieved with various modifications of the basic aircraft. The HPH is inherently stable in forward flight, meeting Military specification flying qualities requirements without artificial stabilization of any kind. The high performance helicopter incorporates a number of basic advances. (Author)

AD-263 555 Div. 1, 26
(TIPSM/BRW) OTS price $2.60

General Dynamics/Convair, San Diego, Calif.
DESIGN AND PRODUCIBILITY CRITERIA FOR WELDED STRUCTURES,
by John Bradshaw. 28 Aug 61, 24p. (Rept. no. ERR-SD-136)
Unclassified report

DESCRIPTORS: (*Aircraft, *Airframes, Structures, Manufacturing methods, *Welding, Brazing, Dictionaries, Design, Instruction manuals.)

A glossary of the known joining processes and a short explanation of each was prepared to familiarize the designer with the wide range of processes available. Some of the processes are quite limited in application, while others are very flexible. In addition to the glossary, a discussion of specific processes and their applications is included as an aid to the designer. (Author)

AD-263 575 Div. 1, 9
(TIPSE/NTM) OTS price $9.10

North American Aviation, Inc., Columbus, Ohio.
AN EXPERIMENTAL AND ANALYTICAL STUDY OF AIRCRAFT RESPONSE TO BUFFETING,
by John R. Post, Nat Botman, and Richard V. Bennett. 6 Sep 61, 102p. incl. illus. tables, 10 refs. (Rept. no. NA60H-742)
(Contract NOa(s) 59-6172-c)
Unclassified report

DESCRIPTORS: (Aircraft, Design, *Tails, Wind tunnel models, Aerodynamics, *Stabilizers, Model tests.) (Perturbation theory, *Wings, Wake, Anemometers, *Turbulence, Measurement, *Turbulent flow.) (Mathematical analysis, Vibration, Pressure.)

The formulation of more rational buffet design criteria is presented. Analytical and experimental techniques for evaluation of the dynamic response of a tail plane to forced excitation by the stalled-wing wake are developed. The design and instrumentation of an aeroelastic wind tunnel model and the experimental program conducted to measure horizontal tail response to buffeting are discussed. A hot-wire anemometer system using single-wire probes was used to measure the velocity perturbations in the wing wake. It is shown that the single-wire probes are not adequate to precisely describe the properties of the turbulence. The assumption that this turbulence is isotropic appears to be invalid; therefore, measurements with a cross-wire probe are recommended to resolve the components of the velocity perturbations. The wing-wake turbulence was found to vary in intensity over the horizontal tail; therefore, an analytical procedure is described to calculate a two-dimensional transfer

function for the horizontal tail. Since it was not feasible to obtain cross-power spectra in this program, a one-dimensional transfer function is calculated using a step-by-step procedure. There is considerable disagreement between this calculation and the transfer function obtained experimentally. Reasons for this are discussed. (Author)

AD-263 681 Div. 1, 12
(TIPSE/DLW) OTS price $1.10

Armour Research Foundation, Chicago, Ill.
INTEGRATION TECHNIQUES FOR DEFENSE SUBSYSTEMS.
Quarterly rept. no. 5, 1 July-30 Sep 59,
by F. B. Smith and J. T. Kirkland. 26 Oct 59,
3p. (Rept. no. ARF 4162-3)
(Contract AF 33(616)5863)
Unclassified report

DESCRIPTORS: (*Aircraft defense systems, *Jet bombers, *Hypervelocity vehicles, Effectiveness, Analysis.) (Aircraft, Flight paths, Aerodynamics, *Plasma physics, Detection, Probability, Interception probabilities, Reduction, Analysis.)

Problems related to the defense of high altitude hypersonic vehicles were studied. This report is a narrative statement of work, and does not contain technical data. (Author)

AD-263 795 Div. 1, 9
(TIPSP/TL) OTS price $.75

National Aeronautics and Space Administration, Washington, D. C.
AN EXPERIMENTAL INVESTIGATION OF THE EFFECTS OF MACH NUMBER, STABILIZER DIHEDRAL, AND FIN TORSIONAL STIFFNESS ON THE TRANSONIC FLUTTER CHARACTERISTICS OF A TEE-TAIL,
by Norman S. Land and Annie G. Fox. Oct 61,
24p. incl. illus. tables (Technical note no. D-924; Supersedes NACA Research Memorandum L57A24, AD-144 792)
Unclassified report

Also available from NASA, Wash. 25, D. C., as NASA Technical note D-924.

DESCRIPTORS: (*Tails, *Patrol bombers, Airplanes, Airplane models, Mach number, Fins.) (Transonic flow, *Flutter, Load distribution, Vibration, Stresses, Pressure, Tests, Model tests, Wind tunnel models.) (Stabilizers (Horizontal tail surface), Elasticity, Aerodynamics.)

A transonic flutter investigation was made of elastically and dynamically scaled models of the tee-tail of a patrol bomber. It was found that removal of the 15 degrees dihedral of the stabilizer used on the airplane raised the flutter boundary to higher dynamic pressures. The effect of Mach number on the flutter boundary was different for dihedral angles of 0 degrees and 15 degrees. The dynamic pressure at the flutter boundary increased approximately linearly with the torsional stiffness of the fin. High-speed motion pictures indicated that the flutter mode consisted primarily of fin bending and fin torsion. (Author)

AD-263 838 Div. 1
(TIPSE/NTM) OTS price $4.60

Princeton U., N. J.
SOME BASIC CONSIDERATIONS REGARDING THE LONGITUDINAL DYNAMICS OF AIRCRAFT AND HELICOPTERS,
by Howard C. Curtiss, Jr. July 61, 41p. incl. illus. (Rept. no. 562)
(Contract DA 44-177-tc-524)
Unclassified report

DESCRIPTORS: (*Helicopters, *Aircraft, Stability, Aerodynamics, Helicopter rotors, *Airframes, *Stability (Longitudinal).) (Subsonic flow, Dynamics, Damping, Velocity, Motion, Pitch.) (Differential equations, Mathematical analysis.)

A discussion of the longitudinal motion of an airframe is presented. General relationships between the stability derivatives of the airplane and the single rotor helicopter are considered. It is shown that the basic character of the longitudinal motion is primarily determined by the angle of attack stability and the velocity stability. The variation in the modes of motion produced by these two stability derivatives is presented. Consideration of the relationships between the flight variables in the modes of motion is included. (Author)

2. ASTRONOMY, GEOPHYSICS AND GEOGRAPHY

AD-263 123 Div. 2, 12
(TIPSP/WH) OTS price $1.60

Westinghouse Electric Corp., Baltimore, Md.
FUNCTION-THEORETIC ANALYSIS OF KEPLER'S EQUATION,
by E. W. Paul. 16 Aug 61, 14p. incl. illus.
(Contract AF 49(638)1002)
(AFOSR 1123) Unclassified report

DESCRIPTORS: (*Celestial mechanics, *Satellite vehicles, *Satellite vehicle trajectories.) (Mathematical analysis, Conformal mapping, Functions, *Series, Complex variables, Algebraic topology.)

Kepler's equation M = E - e sin E is investigated from the function-theoretic standpoint. The complex representation leads to the conformal mapping of the complex E-plane onto the complex M-plane and shows the region of regularity of the function; that is, the region of validity. Single-valuedness of the mapping is shown by construction of a Riemann surface. (Author)

AD-263 153 Div. 2
(TIPSP/GRW) OTS price $1.10

Air Weather Service, Scott Air Force Base, Ill.
AN OBJECTIVE AID FOR FORECASTING STRONG AND GUSTY SURFACE WINDS AT TRAVIS AFB, CALIFORNIA (REVISED).
Aug 61, 7p. incl. illus.
Unclassified report

DESCRIPTORS: (*Weather forecasting, *Wind, *Gusts.) (Meteorological data, Test methods, Reliability, Statistical analysis.) (Air force research, California.) (Terrain, Surface properties.)

AD-263 158 Div. 2, 15, 25
(TIPSP/MFA) OTS price $10.50

California U., Los Angeles.
NUMERICAL STUDIES OF PLANETARY CIRCULATIONS. Final rept.,
by Yale Mintz. 30 June 61, 131p. incl. illus. tables.
(Contract AF 19(604)4963)
(AFCRL-690) Unclassified report

DESCRIPTORS: (*Meteorology, Meteorological data, *Atmosphere models, Upper atmosphere, *Planetary atmospheres, Planets, Wind, Weather forecasting, Energy.) (*Thermodynamics, Heat, Condensation, Temperature, Vortices.) (Numerical analysis, *Difference equations, Integration, *Tables, Computers.) *Linear programming.

The quasi-geostrophic equations of motion were integrated numerically to study the growth of baroclinic waves and the evolution of the mean zonal and mean meridional circulations in a wide channel on the Beta-plane. Starting from an initial state of constant vertical shear of the zonal wind, with zero mean zonal wind at the ground, the governing equations were integrated for periods up to 14 days. In a sequence of experiments, the influence of friction, heating and the Beta-term were successively studied. In all cases there developed a similar surface pattern of growing cyclones and anticyclones that moved respectively northeastward and southeastward, producing thereby mean westerlies in the central latitudes and easterlies in the southern and northern latitudes of the channel. In the higher atmospheric levels, a meandering west-wind maximum developed in the central latitudes and a 3-cell mean meridional circulation formed, in all cases. The phase speeds and growth rates of the perturbations were compared with the results of linear theory. In a separate study, the primitive equations of motion were integrated for a one-dimensional two-level model atmosphere with a free upper surface and constant static stability. A study was made of the growth in this atmosphere, over six days, of an initially small amplitude sinusoidal disturbance. (Author)

AD-263 163 Div. 2, 30, 25, 6
(TIPSE/WAW) OTS price $6.60

Denver Research Inst., Colo.
BALLOON FLIGHT OF MARCH 16, 1961,
by David G. Murcray, James N. Brooks, and Norman J. Sible. 15 Aug 61, 66p. incl. illus.
(Flight data rept. no. 2)
(Contract AF 33(616)7633)
Unclassified report

DESCRIPTORS: (*Upper atmosphere, *Infrared radiation, Measuremnt, Experimental data.) (Balloon gondolas, Balloons, Scientific research, Instrumentation.) (Radiometers, Infrared spectroscopy, Recording devices, Power supplies, Calibration, Design.) (Liquefied gases, Nitrogen, Lead compounds, Selenides, Infrared detectors.)

The results obtained on a balloon flight made with an automatic programmed radiometer system are presented. The radiometer was equipped with a liquid nitrogen cooled PbSe cell as a detector and measurements were made of the infrared background radiation from 1.8 to 5.0 microns. (Author)

AD-263 165 Div. 2
(TIPSP/GRW) OTS price $8.10

Air Weather Service, Scott Air Force Base, Ill.
TERMINAL FORECAST MANUAL. DETACHMENT 6, 8th WEATHER GROUP, KEESLER AIR FORCE BASE, MISSISSIPPI.
May 61, 84p. incl. illus. tables.
Unclassified report

DESCRIPTORS: (*Weather forecasting, *Air force research, Handbooks.) (Meteorological data, Air mass analysis, Wind, Sea breeze, Temperature, Moisture, Precipitation.) (Test methods, Tables.) (Climatic factors, Gulf of Mexico, Mississippi.)

AD-263 176 Div. 2
(TIPSB-JAB) OTS price $2.60

Indiana U., Bloomington.
COMMERCIAL GEOGRAPHY OF ST. VINCENT,
by Arlin D. Fentem. Apr 61, 19p. incl. illus. tables (Technical rept. no. 10)
(Contract Nonr-90813, Proj. NR 388-051; In cooperation with Western Illinois U.)
Unclassified report

DESCRIPTORS: (*Windward Islands, Geography, Commerce, Economic conditions, Terrain, Climatic factors, Sociology, Population.)

St. Vincent is a green, rainy and rugged island of 133 square miles near the southern end of the Lesser Antilles between St. Lucia and the Grenadines. Dominated by both extinct and recently

active volcanoes, only 30 percent of its surface is level enough for cropping. Although its soils are fertile, its population density of almost 2,000 per square mile of cropland makes the struggle for economic survival a strenuous one. The primary economy of the island is agriculture, and other economic activities are directed toward servicing that industry and the people who engage in it. Peasant and plantation production are in balance, and government sponsorship of small, controlled landholdings has been very successful. Subsistence production of ground provisions - tannia, eddoes, sweet potatoes, yams, cassava, etc. - provides a large portion of the food supply, and most of the animal protein consumption is supplied by the island's fisheries. The terraced fields of St. Vincent have an almost oriental appearance and are cultivated with almost oriental intensity. Export crops of $6,628,000 B.W.I. ($3.975,000 U.S.) were produced on 27,000 cultivated acres in 1959, an average of $246 per acre. Few of these acres are even moderately level, and it is unlikely that agriculture can be expanded very much. (Author)

AD-263 177 Div. 2
(TIPSB/JAB) OTS price $3.60

Indiana U., Bloomington.
COMMERCIAL GEOGRAPHY OF BARBADOS,
by Otis P. Starkey. Mar 61, 32p. incl. illus. tables (Technical rept. no. 9)
(Contract Nonr-90813, Proj. NR 388-051)
Unclassified report

DESCRIPTORS: (*Windward Islands, Geography, Commerce, Economic conditions, Terrain, Climatic factors, Sociology, Population.)

Until a century ago this coral island, strategically located 100 miles east of the other Lesser Antilles and blessed with fertile limestone soils, held commercial leadership in the Eastern Caribbean. Its growing population, now 235,000 or 1, 400 per square mile, puts it among the most densely settled political units in the world. Today, as for three centuries, sugar provides the bulk of its exports and sugar cane still occupies most of its arable land. However, tourism, merchandizing profits, remittances from overseas, and the beginning of an industrial economy, now supplement sugar as sources of income. Barbados is a medium-sized frog in a small pond. Its exports surpass those of all the British Windwards and Leewards put together although it has only half the population of those islands. Barbadians earn more and live better than neighboring islanders; they are better-educated, more hard-working, and more thrifty. Their island is well cultivated, an almost English landscape plus palms. (Author)

AD-263 234 Div. 2, 25
(TIPSP/WH) OTS price $1.10

Ramo-Wooldridge Corp., Los Angeles, Calif.
LUNAR TRAJECTORY COMPUTATIONS,
by T. A. Magness, R. B. Muchmore and others.
7 Feb 58, 8p. (Rept. no. GM47.3-8)
Unclassified report

DESCRIPTORS: (*Lunar probes, Satellite vehicle trajectories, *Celestial mechanics, Ballistics.) (Equations, Motion, Differential equations.)

AD-263 237 Div. 2
(TIPSP/GRW) OTS price $9.10

Air Force Special Weapons Center, Kirtland Air Force Base, N. Mex.
TABLES OF ADIABATIC INVARIANTS FOR THE GEOMAGNETIC FIELD 1955.0,
by D. C. Jensen, R. W. Murray, and J. A. Welch, Jr. Apr 60, 109p. incl. tables (AFSWC TN 60-8)
(Proj. 7811)
Unclassified report

DESCRIPTORS: (*Rocket research, *Satellite vehicle research, *Terrestrial magnetism, Harmonic analysis, Special functions, Integrals.) (Van Allen radiation belt, Magnetic effects, Tables.)

As an aid to interpretation of satellite and rocket observations of the Van Allen radiation belts, a series of tables and graphs of geomagnetic field quantities is given. This first volume contains tables of the first two adiabatic invariants, the scalar field strength B and the action integral I equals the integral of Vdl. The high order fit (n equals 25, m equals 18) was necessary to properly handle the Capetown Anomaly and eliminate systematic deviations of up to 7%. Using surface data, high order multipole expansion in spherical harmonics is produced. The data are Epoch 1955.0. (Author)

AD-263 351 Div. 2, 15
(TIPSP/GRW) OTS price $2.60

Applied Mathematics and Statistics Lab., Stanford U., Calif.
WAVES IN SHALLOW WATER,
by Marvin Shinbrot. 21 Aug 61, 24p. (Technical rept. no. 97)
(Contract Nonr-22511, Proj. NR-041-086)
Unclassified report

DESCRIPTORS: (*Water waves, Theory, Motion, Mathematical analysis, Integral equations.)

AD-263 384 Div. 2, 6
(TIPSP/GRW) OTS price $1.60

Air Weather Service, Scott Air Force Base, Ill.
THE ASSOCIATION OF THIN LINE RADAR ECHOES TO GUST FRONTS,
by Allan C. Ramsay. 28 June 61, 19p. incl. illus.
(Rept. no. 4WGP-105-10-1)
Unclassified report

DESCRIPTORS: (*Air mass analysis, Gusts, Radar analysis, *Radar echo areas.) (Meteorological radar, Storms, Thunderclouds, Moisture, *Weather forecasting.)

Radar observations of two thin-line echoes are presented as observed at Maxwell Air Force Base, Alabama in June, 1960. Their relationship to the occurrence of first gusts from air-mass thunderstorms is shown. (Author)

AD-263 459 Div. 2, 15, 25
(TIPSP/MFA) OTS price $35.10

Geophysics Corp. of America, Bedford, Mass.
ATMOSPHERIC PROCESSES,
by P. J. Nawrocki and R. Papa. Aug 61, 706p. incl. illus. tables, 719 refs. (GCA Rept. no. 61-37-A)
(Contract AF 19(604)7405)
(AFCRL-595) Unclassified report

Division 2- ASTRONOMY, GEOPHYSICS AND GEOGRAPHY

DESCRIPTORS: (*Atmosphere, *Upper atmosphere, Ionosphere, Turbulence.) (*Solar energy, Compton effect, Compton scattering.) (*Electromagnetic waves, Magnetohydrodynamics, Terrestrial magnetism, Radio waves, Radiofrequency.) (*Cosmic rays, Ultraviolet radiation, Infrared radiation, Thermal radiation.) (*Quantum mechanics, Particles, Electrons, Protons.) (*Chemical elements, *Mechanical properties, Optical systems, Fluorescence, Aurorae, *Plasma physics.) (Theory, *Functions, Equations, Integral equations, Vector analysis, Tensor analysis, Fourier analysis, Special functions, Integral transforms, Matrix algebra, Statistical analysis, *Tables.) Handbooks, Meteorology.

A comprehensive handbook on upper atmospheric processes and research principles is given. The emphasis is placed upon particle-particle and particle-field relationships which enter into the determination of the macroscopic dynamics of the upper atmosphere. Some fundamental theory and data are presented from which development of comparatively undeveloped topics is made. The topics discussed are: (1) the upper atmosphere, (2) the solar spectrum and cross-sections for photoionization and absorption, (3) reaction rates, (4) atomic transition probabilities, (5) molecular diffusion, (6) atmospheric turbulence, (7) solutions of the continuity equation, (8) energy loss processes of solar corpuscles, (9) generation of electromagnetic waves, (10) transmission of electromagnetic waves, (11) cosmic rays, (12) geomagnetism, and (13) plasma dynamics. Numerous tables and a set of appendices on geophysical constants, general physical relations, and units are listed.

AD-263 462 Div. 2, 6, 8, 12, 25
(TIPSE/DLW) OTS price $1.60

Science and Tech. Section, Air Information Div., Washington, D. C.
TRACKING OF MISSILES AND SPACE VEHICLES REVIEW OF SOVIET LITERATURE.
Monthly rept. no. 13, July-Aug 61.
31 Aug 61, 9p. incl. illus. (AID rept. no. 61-124)

Unclassified report

DESCRIPTORS: (*Plasma physics, Ionosphere, Perturbation theory, Ions, Electrons, Electric fields, Theory, Plasma oscillations, Magnetohydrodynamics, Electromagnetic waves, Magnetic fields.) (Guided missiles, Satellite vehicles, Tracking.) (Technological intelligence, Translations, USSR.) (*Radio astronomy, Solar noise, Extraterrestrial radio waves, Very low frequency, Meteors, Detection, Moon.) (*Masers, Ammonia, Frequency, Standards, Frequency stabilizers, Design.) Ionospheric disturbances.

Contents:
On the interaction of beams of charged particles with low-frequency plasma oscillations
Study of the dependence of maser frequency on various parameters
Determination of the mean-square error of the number of meteors observed in a unit of time
Sporadic solar radio emission at low frequencies
Incoherent radio emission occurring during the motion of charged particles in the earth's magnetic field
Perturbations in the ionosphere caused by a moving body
Study of individual radiants of the Geminid showers
Results of an experimental study of lunar radio emission in the 4-mm wavelength range

AD-263 474 Div. 2, 6
(TIPSP/MFA) OTS price $1.60

Air Weather Service, Scott Air Force Base, Ill.
APPLICATIONS OF INFRARED MEASUREMENTS IN METEOROLOGY,
by Frederick B. House and James R. Blankenship.
June 61, 18p. incl. illus. tables (Technical rept. no. 157)

Unclassified report

DESCRIPTORS: *Meteorology, Measurement, *Infrared detectors, *Infrared radiation, Electromagnetic waves, Albedo (Astronomy), Clouds, Radiometers, Weather forecasting, Satellite vehicles, Thermodynamics, *Meteorological radar.

AD-263 477 Div. 2
(TIPSP/GRW) OTS price $5.60

General Dynamics/Electronics, Rochester, N. Y.
GEOMAGNETIC FLUCTUATION STUDIES.
Annual rept. 1 Apr 60 to 15 May 61,
by R. A. Santirocco and G. C. Foster. 15 May 61, 54p. incl. illus. tables.
(Contract Nonr-261200)

Unclassified report

DESCRIPTORS: (*Terrestrial magnetism, Electromagnetic waves, Magnetic fields, Atlantic islands, Azores, Sea water.) (*Instrumentation, Design, Magnetic effects, Mechanics, Electric currents, *High frequency.)

A system was constructed for the measurement of geomagnetic fluctuations in the spectral region 0.01 to 100 cycles per second. Studies were to be made at a mid-ocean island site of the effects of ocean conductivity on micropulsations and ELF(Extremely Low Frequency) background. The field sensor was a 50,000-turn air core loop, four feet in diameter, with an effective area of 5.65 x 10 to the fourth power square meters. Its sensitivity at one cycle per second was 0.315 millivolt per gamma. The loop fed a low-frequency channel with zero to one cycle per second bandpass. Ten per cent of the loop winding was tapped for a high-frequency channel of bandpass 1 to 100 cycles per second. Signals were recorded with pen recorders and on magnetic tape. Field observations were attempted on Santa Maria island in the Azores during November 1960. Technical difficulties which are analyzed in detail prevented the acquisition of useful data. On the basis of this experience, a new loop antenna was constructed of 67,000 turns wrapped around an eight-foot mumetal bar. The sensitivity of this loop is 0.38 millivolt per gamma at one cycle per second. This antenna, used in conjunction with differential DC amplifiers yielded excellent preliminary results for frequencies up to several cycles per second. An interesting observation of correlations between auroral phenomena and magnetic fluctuations is presented, and recommendations for the completion of the scientific objectives of this program are made. (Author)

AD-263 521 Div. 2, 20, 12
(TIPSP/WH) OTS price $2.60

Aerospace Corp., El Segundo, Calif.
DEVELOPMENT OF NEUTRON-GAMMA RAY INSTRUMENTATION FOR LUNAR SURFACE COMPOSITION ANALYSIS.
Semiannual technical rept. 1 Jan-30 June 61,
by E. F. Martina and E. R. Carlson. 30 June 61, 15p. incl. illus. (Rept. no. TDR-594(1244-02)TR-1)
(Contract AF 04(647)594)

Unclassified report

DESCRIPTORS: (*Astrophysics, *Moon, *Planets, Abundance.) (*Lunar probes, *Space probes, Instrumentation, Tritium, Deuterium.) (Neutrons, Gamma rays, Detectors, Radiation counters.) Chemical elements, (Targets, Nuclear reactions.)

An analysis technique capable of determining the nature and relative abundance of constituent elements at remote places, such as the lunar and planetary surfaces, is described. A brief theoretical discussion is followed by details on accomplishments to date in developing a prototype instrument for analysis of the lunar surface. (Author)

AD-263 541 Div. 2, 6
(TIPSP/GRW) OTS price $16.00

Texas A. and M. Coll., College Station.
UTILIZATION OF AN/CPS-9 RADAR IN WEATHER ANALYSIS AND FORECASTING.
Final rept.,
by Tom E. Sanford. June 61, 238p. incl. illus. tables (Ref. no. 60-24T)
(Contract AF 19(604)6136)
(AFCRL-800) Unclassified report

DESCRIPTORS: (*Weather forecasting, *Meteorological radar, *Storms, Thunderclouds, Precipitation.) (Meteorological data, Radar reflections, *Radar echo areas, Texas, Tables.) Hurricanes, Radar analysis.

During the thunderstorm seasons of 1959 and 1960 data were collected of subtropical thunderstorms occurring in north-central, central, and southeast Texas. The AN/CPS-9 radar was employed. Observations were obtained of radar reflectivities at various storm levels and maximum echo heights. Comparison of statistical summaries of Texas and New England thunderstorms reveals that tops of Texas thunderstorm echoes appear somewhat higher and reflectivities slightly less, at all levels, particularly in the lower parts of the storms. Due to the uncertainty in the absolute calibration of the radars no conclusion can be drawn that values of the radar reflectivity for Texas thunderstorms differ significantly from those for New England storms. (Author)

AD-263 544 Div. 2
(TIPSP/GRW) OTS price $6.60

Wisconsin U., Madison.
STRATIFICATION OF UPPER LEVEL WINDS USING HEIGHT DIFFERENCE AND GEOSTROPHIC VORTICITY,
by Earl P. Snyder, Jr., Lyle H. Horn, and Donald R. Johnson. Feb 61, 66p. incl. illus. tables (Scientific rept. no. 5)
(Contract AF 19(604)5191)
(TN61-844) Unclassified report

DESCRIPTORS: (Upper atmosphere, *Stratosphere, *Wind, *Weather forecasting, Jet streams (Meteorology).) (Vortices, Barometric pressure, Height finding, Climatic factors, Statistical analysis, Tables.) (Meteorological charts, Meteorological data, Europe, Northern hemisphere.)

As an experiment in stratified climatology, height difference and geostrophic vorticity were tested as predictors for the 300-mb geostrophic winds over eastern Europe. Eight years of winter season data (1950-1957) and data for March 1958 were used. Forecasts using stratified data were compared with those of unstratified climatology. Certain stratifications showed significant improvement over climatology. (Author)

AD-263 546 Div. 2, 22
(TIPSP/GRW) OTS price $4.60

Army Signal Missile Support Agency, White Sands Missile Range, N. Mex.
DENSITY AND PRESSURE PROFILES DERIVED FROM METEOROLOGICAL ROCKET MEASUREMENTS,
by Otto W. Thiele. Sep 61, 40p. incl. illus. tables, 31 refs. (Technical rept. no. 108)
Unclassified report

DESCRIPTORS: (Upper atmosphere, *Meteorological data, Barometric pressure, Density, Determination, *Atmospheric sounding.) (*Sounding rockets, Recording devices, Radiosondes, Collecting methods.) (Guided missiles, Satellite vehicles, Re-entry vehicles, Drag, Statistical analysis, Tables.)

This analysis presents a limited statistical treatment of recently acquired density and pressure data between 30 and 68 km. These data were derived from direct temperature and height measurements made with meteorological rockets fired at White Sands Missile Range, New Mexico and Fort Churchill, Canada, during Meteorological Rocket Network activities and normal range support. Primary emphasis is given to seasonal and latitudinal variations. The density variation with respect to all of the data at a particular altitude, is as much as 50% in some cases. Another significant feature relative to the value of the data is the remarkable consistency of a group of data for a particular season and station. The data are presented in tabular form as well as graphically for closer inspection. (Author)

AD-263 565 Div. 2, 25
(TIPSP/WH) OTS price $8.60

Columbia Radiation Lab., New York.
THE OBSERVATION OF THREE CENTIMETER RADIATION FROM ASTRONOMICAL OBJECTS WITH RUBY MASER.
Special technical rept. on Research Investigation Directed Toward Extending the Useful Range of the Electromagnetic Spectrum,
by R. Novick. 1 June 61, 96p. incl. illus. tables.
(Contract DA 36-039-sc-78330)
Unclassified report

DESCRIPTORS: (*Planets, Mars, Venus, Jupiter.) (*Radio astronomy, Radiometers, Microwaves, Infrared radiation, Microwave oscillators, Masers.) (*Temperature, Measurement, Thermal radiation.)

Contents:
Theory of maser amplification
Properties of Ruby
Three-level maser mechanism
Amplifier gain and bandwidth
Noise
Radiometer sensitivity
Observations of planetary radiation
Radiometer calibration
Antenna calibration
Data taking and processing
Sources of systematic error
Observations of Venus, Mars, and Jupiter
Planetary radiation of Jupiter, Venus, and Mars
Observations of planetary nebulae
Comparison with optical measurements
Hydrogen line
Observations of discrete radio sources
Observational details
Method of data reduction
Spectra of Cassiopeia A and Cygnus A
The phonon bottleneck effect

Division 2 - ASTRONOMY, GEOPHYSICS AND GEOGRAPHY

AD-263 577 Div. 2
(TIPSB/MS) OTS price $2.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
THE SALINITY AND DENSITY OF NATURAL AND FLOODED SEA ICE AT THULE, GREENLAND, 1958,
by A. I. Funai. 13 Sep 61, 21p. incl. illus. tables, 10 refs. (Technical rept. no. 161)
Unclassified report

DESCRIPTORS: *Greenland, *Ice, Sea water, Salinity, Density, Data.

As a part of the Laboratory's Ice Engineering Research Program, the salinity and density of ice formed by successively flooding and freezing 3-inch layers of sea water onto the top of a natural sea-ice sheet were determined and compared with similar determinations from the undisturbed natural sea ice. The flooded-ice salinity data averaged 10.9 parts per thousand, or over twice the average for natual sea ice but only a third the salinity of the sea water used for the floodings. The flooded-ice density data averaged 0.867 gm/cc, or about 7 percent lower than the average density of natural sea ice. The air content of the flooded ice, estimated from the density data, was between 8 and 10 percent by volume, or from 1.5 to 3 times greater than the brine content of the ice at -20 C. The variability of the natural-ice data. An analysis of the salinity data from both types of ice indicated that from 70 to 90 percent of the total variance could be attributed to variations of salinity with strata or layer depth. (Author)

AD-263 590 Div. 2, 12, 25
(TIPSP/GRW) OTS price $1.10

Astrophysical Observatory, Smithsonian Institution, Cambridge, Mass.
DIFFERENTIAL ORBIT IMPROVEMENT WITH THE USE OF ROTATED RESIDUALS.
Rept. on Research in Space Science,
by Imre G. Izsak. 10 Aug 61, 9p. incl. illus. (Special rept. no. 73)
Unclassified report

DESCRIPTORS: (*Satellite vehicles, Satellite vehicle trajectories, *Orbital flight paths.) (Drag, Time, Errors.) (Corrections, Geodetic astronomy, Mathematical analysis, Least squares method.)

A new technique of differential orbit improvement is described, in which the residuals in right ascension and declination are not used directly, but are rotated to obtain two other components. One of the components does not contain the timing error of the observations and the effect of irregular changes in air dnag to the first order; the other does contain these effects to the largest possible extent. Important applications of the method include the correction of station coordinates and the determination of tesseral harmonics in the gravitational potential of the earth. Special attention is paid to the case of small eccentricities. (Author)

AD-263 649 Div. 2, 5, 25
(TIPSP/WH) OTS price $1.60

Maryland U., College Park.
INTERACTION OF WEST FORD NEEDLES WITH THE EARTH'S MAGNETOSPHERE,
by S. F. Singer. Sep 61, 15p. incl. tables, 23 refs. (Technical rept. no. 227)
(AFOSR Grant no. 61-57)
(AFOSR-1400) Unclassified report

DESCRIPTORS: (*Terrestrial magnetism, Dipole antennas, Drag, *Electromagnetic fields.) (*Exosphere, Electrostatic fields.) (Microwaves, Scattering, Ionosphere.)

The proposed West Ford experiment envisages the creation of a belt of orbiting dipoles for communication purposes. Because of the large area-to-mass ratio of the needles the perturbing effects of radiation pressure are of great importance. It is argued here that the needles will acquire an electric charge, and that perturbations due to Coulomb drag and Lorentz force cannot be neglected. Coulomb drag will lead to a much more rapid shrinkage of the orbit than ordinary drag; their effects are tabulated. Finally, a modification of the West Ford experiment is suggested which could separate the perturbing effects; this would lead to a direct experimental determination of the parameters which enter into the theory of the interaction of small particles with the magnetosphere (the region, from the ionosphere out to about 10 earth radii, where the geomagnetic field is a controlling factor). (Author)

AD-263 664 Div. 2, 4
(TIPSP/MA) OTS price $1.10

Science and Tech. Section, Air Information Div., Washington, D. C.
N. A. KOZYREV'S VIEW ON THE NATURE OF THE LUMINESCENCE OF THE VENUSIAN CLOUDS AND THE COMPOSITION OF THE VENUSIAN ATMOSPHERE.
8 Aug 61, 2p. (AID rept. 61-116)
Unclassified report

DESCRIPTORS: (*Atmosphere, *Clouds, Venus, *Luminescence, Ionosphere.) (Chemical properties, Physical properties.) (*Gases, Carbon dioxide, Water vapor, *Formaldehyde.) *Planetary atmospheres.

Some comments are made on certain inaccurate newspaper accounts of scientific material stated by N. A. Kozyrev on the nature of luminescence of the clouds and atmosphere of the planet Venus. These statements are to the effect that the newly discovered continuous luminescence inside or below the clouds of the Venusian atmosphere is different from ionospheric luminescence. He contends that it is chemical in nature and that it is a physical phenomenon accompanying the formation of formaldehyde.

AD-263 665 Div. 2, 4
(TIPSP/MFA) OTS price $1.10

Science and Tech. Section, Air Information Div., Washington, D. C.
ROTATION OF THE PLANET VENUS.
10 Aug 61, 2p. (AID rept. 61-117; Trans. of On Some Questions Relating to Venus. K'o Hsueh T'ung Pao 4:38-43, 1961)
Unclassified report

DESCRIPTORS: (*Astronomy, Astronomical data, Planets, Radio astronomy, *Venus.) (*Atmosphere, Clouds, *Temperature, Chemistry, Carbon dioxide, Oxygen, Nitrogen, Water vapor, Planets.) (Periodic variations, Planets, Planetary atmospheres.)

A review and summary are presented on some of the problems that are related to the rotation of the planet Venus as follows, such that: (1) rotational periodicity requires between 1 and 225 days, (2) variation in the inclination of the axis is claimed for values from 0 degrees to 90 degrees, (3) calculations on the obliquity of the ecliptic average 23 degrees, (4) temperatures at the surface range from 140 C to 310 C, (5) there is an atmosphere rich in carbon dioxide, (6) the planet surface may be windy desert, and (7) the planet is covered with seas and lacks continents.

AD-263 668 Div. 2, 25
(TIPSP/WH) OTS price $1.60

Science and Tech. Section, Air Information Div., Washington, D. C.
PHENOMENA IN THE UPPER ATMOSPHERE. REVIEW OF SOVIET LITERATURE.
Monthly rept. no. 16 for Aug 61.
31 Aug 61, 17p. incl. illus. (AID rept. 61-121)
Unclassified report

DESCRIPTORS: (USSR.) (*Astrophysics.) (*Upper atmosphere, *Ionosphere, Solar energy, Atmospheric electricity, Solar disturbances.) (Sunspots, Terrestrial magnetism, Solar corona.) (Radio astronomy, *Geophysics.)

Contents:
Solar radiation and the ionosphere
Investigation of the ionosphere above Khar'kov
Drift of small-scale inhomogeneities in the F2 layer
Geomagnetic activity after large chromospheric flares
Variations of the conversion coefficient of the ionosphere according to data obtained by measuring of oblique incidence in the long-wave range
Motion picture investigation of solar granulation
On a chromospheric flare in which movement was detected
Characteristics of the ionosphere above Ashkhabad in March 1960
On possible correlations between fluctuations of solar activity and differential solar rotation
Wavelike structure of the ionosphere
Striated structure of the corona
On the rapid change of magnetic field in sunspots
Measurements of electron concentration in the ionosphere at altitudes from 420 to 470 km made by radio waves emitted from geophysical rockets
Atmospheric electricity
On the distribution of droplet charges in cumulus clouds

AD-263 682 Div. 2
(TIPSP/MA) OTS price $4.60

Armour Research Foundation, Chicago, Ill.
STUDY OF METEOROLOGICAL SURVEILLANCE OBSERVING SYSTEM.
Final rept., 1 July 59-30 Sep 60,
by E. Uretz. 30 Sep 60, 43p. incl. illus. (Rept. no. ARF 5125)
(Contract DA 36-039-sc-80328)
Unclassified report

DESCRIPTORS: (Meteorology, *Meteorological data, *Meteorological instruments, Altimeters, Radiometers, Acoustic detectors, Radar equipment, Wind direction indicators, *Micrometeorology.) (Temperature charts, Humidity, Wind, Water vapor, Electromagnetic waves.) (*Digital computers, Servo systems.) Equations, Simultaneous equations.

Techniques for passively measuring micrometeorological variables are described. A system for determining temperature, pressure, relative humidity and wind velocity by passive means is presented. A recommendation for the construction and test of microwave and infrared radiometers as a first step toward implementing the entire system is made.

AD-263 683 Div. 2, 30
(TIPSP/MA) OTS price $2.60

Armour Research Foundation, Chicago, Ill.
STUDY OF METEOROLOGICAL SURVEILLANCE OBSERVING SYSTEM.
Addendum to Final rept. 1 July 59-30 Sep 60,
by E. Uretz. 30 Sep 60, 26p. incl. illus.
(Addendum to Final rept. no. ARF 5125, AD-263 682)
(Contract DA 36-039-sc-80328)
Unclassified report

DESCRIPTORS: (*Micrometeorology, *Meteorological data, Air, *Density, *Temperature, *Temperature charts, Oxygen, Atmosphere, Attenuation, Equations, Integration.)

Results are given of the calculations of A, the atmospheric attenuation due to molecular oxygen, as a function of the temperature and air densities which are found in the ARDC standard atmosphere for the following heights: 0, 0.5, 1, 1.5, 2, 2.5, 3, 3.5, 4, 4.5, 5, 6, 7, 8, 9, 10, and 15 km. These results are given graphically for each height where A is plotted in decibels per kilometer versus frequency in kilomegacycles. (Author)

AD-263 684 Div. 2, 30, 15
(TIPSP/MA) OTS price $3.60

Armour Research Foundation, Chicago, Ill.
STUDY OF METEOROLOGICAL SURVEILLANCE OBSERVING SYSTEM.
Quarterly progress rept. no. 5, 1 July-30 Sep 60,
by E. F. Uretz. 30 Sep 60, 34p. incl. illus.
(Rept. no. ARF 5125-5)
(Contract DA 36-039-sc-80328)
Unclassified report

DESCRIPTORS: (Meteorology, *Meteorological data.) (*Meteorological instruments, Wind direction indicators, Acoustics, Radiometers, Infrared equipment, Radiation instruments, Microwave equipment, Radar equipment.) (*Atmosphere, Temperature, *Wind, *Humidity.) (*Computers, Data processing systems.) (Equations, Integrals, Differential equations.) *Micrometeorology.

Block diagrams of the low level wind velocity measuring subsystem are given. The results of the computer simulation of an infrared radiometer and the subsequent reduction computation are presented and discussed. (Author)

Division 2-ASTRONOMY, GEOPHYSICS AND GEOGRAPHY

AD-263 787 Div. 2
(TIPSP/GRW) OTS price $1.60

Lamont Geological Observatory, Palisades, N. Y.
MAGNETIC TOTAL INTENSITY MEASUREMENTS ON LAKE ERIE,
by G. Peter and R. E. Wall. July 61, 5p. illus.
(Technical rept. no. 1; CU-2-61)
(Contract Nonr-26648)

Unclassified report

DESCRIPTORS: (*Terrestrial magnetism, Great Lakes, Geological survey.) (Magnetic fields, Intensity, Measurement, Magnetometers.)

During August and September of 1960, total magnetic field intensity measurements were made on Lake Erie. This analysis presents a total magnetic intensity contour map of the main survey area, and total magnetic intensity profiles from the eastern part of the lake. (Author)

AD-263 788 Div. 2
(TIPSP/GRW) OTS price $9.10

Lamont Geological Observatory, Palisades, N. Y.
VEMA CRUISE NO. 16 GEOMAGNETIC MEASUREMENTS,
by James R. Heirtzler. July 61, 107p. incl. illus. tables (Technical rept. no. 2; CU-3-61)
(Contract Nonr-26648)

Unclassified report

DESCRIPTORS: (*Hydrographic surveying, *Geological survey, *Terrestrial magnetism, Measurement.) (Magnetic fields, Intensity, Recording devices, Magnetometers.) (Northern hemisphere, Southern hemisphere, Oceans, Depth finding, Tables.)

A program was conducted for measuring the total intensity of the geomagnetic field in marine areas. Most of the measurements were made with a towed magnetometer. The intent is to obtain total intensity profiles to assist in the analysis of detailed geological features. (Author)

AD-263 806 Div. 2, 25
(TIPSP/MFA) OTS price $1.60

Maryland U., College Park.
ELECTROSTATIC SCREENING OF BODIES IN SPACE,
by S. F. Singer and E. H. Walker. Sep 61, 19p. incl. illus. (Technical rept. no. 226)
(Grant AF-AFOSR 61-57)
(AFOSR 1399)

Unclassified report

DESCRIPTORS: (Plasma physics, *Space environmental conditions, *Bodies of revolution, Spheres, Moon.) (*Electrostatics, Electrons, Thermal radiation, Photoelectric effect, Photoelectrons.) (Energy, Surfaces.)

Bodies in space subject to the solar ultraviolet flux will emit photoelectrons. A certain number of these escape and are balanced by the accretion of thermal electrons from the surrounding plasma. For a positively charged body, a much larger number of photoelectrons is released from the surface but do not escape because their energy is insufficient to do so. Their effect is to produce an inner screening of the body's electric charge. This screening is calculated for spherical bodies as a function of size. For large bodies the space charge density of photoelectrons becomes quite large; in the case of the Moon it reaches a value of the order of 1000 to 10,000 electrons per cc just above the lunar surface. For small dust particles, however, the photoelectric cloud becomes negligible. (Author)

AD-263 826 Div. 2
(TIPSP/GRW) OTS price $4.60

Electrical Engineering Research Lab., U. of Texas, Austin.
RESEARCH IN TROPICAL METEOROLOGY. DESIGN OF A LONG RANGE PROGRAM OF BASIC RESEARCH IN TROPICAL METEOROLOGY.
Final rept., pt. 1, 1 July 60-30 June 61,
by Wilfried H. Portig and John R. Gerhardt.
30 June 61, 30p.
(Contract DA 36-039-sc-84937, Proj. 3A99-07-001-08)

Unclassified report

DESCRIPTORS: (*Meteorology, *Tropical regions, Weather forecasting.) (Scientific research, Instrumentation, Collecting methods.)

A broad scale plan is presented on a basic research program in tropical meteorology which will permit a significant contribution to our knowledge of essential meteorological processes pertinent to the tropics. A five year project is envisioned involving the participation of several research groups and coordination with existing meteorological organizations and facilities. Selected problem areas are outlined, some of which can be effectively studied using existing data and previous analyses with the remainder requiring new measurements. These would be obtained through the use of specially equipped field observation teams and aircraft reconnaissance flights. It is recommended that details of this plan pertinent to problem area specifications, scheduling, observation team locations, instrumentation, logistics and costs be worked out through appropriate study conferences. (Author)

AD-263 827 Div. 2
(TIPSP/GRW) OTS price $6.60

Electrical Engineering Research Lab., U. of Texas, Austin.
RESEARCH IN TROPICAL METEOROLOGY. SOME MESOSCALE METEOROLOGICAL PHENOMENA OF THE CARIBBEAN AREA.
Final rept., pt. 2, 1 July 60-30 June 61,
by Wilfried H. Portig and Virgil C. Kowalik.
30 June 61, 57p. incl. illus.
(Contract DA 36-039-sc-84937, Proj. 3A99-07-001-08)

Unclassified report

DESCRIPTORS: (*Meteorology, *Tropical regions, Weather forcasting, Caribbean Sea.) (Clouds, Storms, Climatic factors, Air mass analysis.) (Wind, Meteorological charts.)

An anticyclonic outdraft over the northern Gulf of Mexico is described which is obviously the consequence of outflowing cold air produced by thunderstorms. The data fit well to the model developed for land areas and predicted for tropical oceans. The effect of strong wind shear on tropical cumulonimbi is discussed. Contrasting to the experience in higher latitudes, a wind shear is not a prerequisite of hail formation

but that a strong shear diminishes rather than enhances the precipitation. A case is described in which parts of a plume display moist unstable ascent to very great altitudes which are numerically determined by the known heights of wind shears. The upper air conditions immediately preceding the formation of tropical storm ARLENE are presented. Thermodynamical instability in the higher troposphere together with relatively high stability in lower layers was found near the location where the storm formed. The unusual moisture content of the entire (as far as revealed by measurements) troposphere probably provided the energy which was released by the instability aloft. Computation of the sum of momentum from the ground upward seems to prove that the mixing layer (friction layer) is much higher than assumed (about 10,000 feet). The mean wind conditions during the period 27-30 June 1959 are shown at eight levels. (Author)

AD-263 828 Div. 2
(TIPSP/GRW) OTS pnice $9.60

Electrical Engineering Research Lab., U. of Texas, Austin.
RESEARCH IN TROPICAL METEOROLOGY. AUTHOR BIBLIOGRAPHY.
Final rept., pt. 3,
by Wilfried H. Portig and Shirley J. Durie.
30 June 61, 105p.
(Contract DA 36-039-sc-84937, Proj. 3A99-07-001-08)

Unclassified report

DESCRIPTORS: (*Meteorology, *Tropical regions, Weather forecasting, Military operations, *Bibliography.)

AD-263 847 Div. 2, 30
(TIPSP/GRW) OTS price $2.60

Air Force Cambridge Research Labs., Bedford, Mass.
CEDAR HILL METEOROLOGICAL RESEARCH FACILITY,
by D. W. Stevens. June 61, 16p. incl. illus.
(Instrumentation for Geophysics and Astrophysics no. 18; AFCRL-632)
(Proj. 7655)

Unclassified report

DESCRIPTORS: (Atmosphere, *Meteorological data, Collecting methods.) (Height finding, Wind, Temperature, Measurement, *Data transmission systems, Punched card methods, Automatic.) (*Meteorological instruments, Towers, Texas.) Calibration.

A meteorological data system was designed, assembled, and installed to obtain, on a continuous basis, wind and temperature information at 12 levels on a television transmitting tower 1434 ft in height. Measurement and recording of these atmospheric variables is accomplished entirely automatically, the output being in the form of punched paper tape and a record prepared by an electric typewriter. The tower being used as an instrument support is triangular in cross-section, measuring 12 ft on a side with no taper, is extensively guyed, contains a 2000-lb capacity elevator, and is capped by a triangular superstructure 75 ft on a side and about 14 ft high. It is located at Cedar Hill, Texas, a small town approximately 20 miles south-southwest of Dallas, on a low ridge at an elevation of 850 ft MSL. To the West and North the terrain elevation decreases by about 300 ft in a distance of 3 to 5 miles; to the South and East there is much less change in elevation. (Author)

AD-263 876 Div. 2, 6
(TIPSP/GRW) OTS price $2.60

Florence U. (Italy).
DETERMINATION OF THE DIRECTION CORRESPONDING TO THE MAXIMUM RATE OF RADAR ECHOES FROM METEOR TRAILS,
by Nello Carrara, Pier Francesco Checcacci, and others. Dec 60, 22p. incl. illus. (Technical note no. 1)
(Contract AF 61(052)477)
(AFCRL-538)

Unclassified report

DESCRIPTORS: (*Meteors, *Radar tracking, Detection, *Direction finding, Determination.) (*Radar echo areas, Frequency, Density, Measurement, Nomographs.)

The height over the ground was determined corresponding, in a given direction, to the maximum density of echoes from meteor trails which can be detected by Radar. The direction was found corresponding to the maximum rate of radio echoes. The angle of such a direction with respect to the zenith of the Radar is found to be the equivalent of 57 degrees, while preceding results gave 45 degrees. The assumption is made that the radiant distribution is uniform. (Author)

3. CHEMICAL WARFARE EQUIPMENT AND MATERIALS

AD-263 202 Div. 3
(TIPSB/CDW) OTS price $1.60

Ogden Air Materiel Area, Hill Air Force Base, Utah.
SERVICEABILITY OF SIGNAL, SMOKE, AND ILLUMINATION, AIRCRAFT, AN-MK 5 MOD 4.
Ammunitions Test rept.,
by John H. Schnabel. Sep 61, 17p. incl. illus. tables (OOY TR 61-35)

Unclassified report

DESCRIPTORS: *Smoke signals, *Illuminating projectiles, Aircraft, Storage, Tests.

Tests were conducted to determine the serviceability of the AN-Mk 5 Mod 4 Signal. All signals were visually inspected for defects, ten were disassembled for internal inspection, and 60 were function tested. The function tests consisted of dropping the signals into a body of water 20 ft in depth from an aircraft at an altitude of 500 ft and an air speed of 150 knots. Through visual inspection, all signals appeared to be materially satisfactory and all internal components in good condition. Of the 60 signals function tested, two failed to function, two emitted smoke and flame less than the required 10 min, and eight had a smoke density of less than one-half of normal. Four of the five lots tested were serviceable. Based on the 60 signals tested, at a 95% confidence level, the functional reliability is between 88% and 100%. Based on the four serviceable lots (42 signals), at a 95% confidence level, the functional reliability is between 92.8% and 100%.

AD-263 279 Div. 3, 4
(TIPSM/EJH) OTS price $1.10

Notre Dame U., Ind.
CWS PROJECT.
Progress rept. 1 Nov 46-15 Jan 47,
by Charles C. Price. 15 Jan 47. 3p.
(Contract W 18-035-CWS-1312)
Unclassified report

DESCRIPTORS: (*Chemical warfare agents, *G agents, Phosphorous compounds, Methyl radicals, Ethanols, Amines, Oxychlorides, Chemical reactions, Synthesis.) (*Chemical warfare agents, Ethyl radicals, Alkoxy radicals, Silicon compounds, Fluorides, Chemical reactions, Synthesis, Physical properties.)

AD-263 453 Div. 3, 22
(TIPSB/MS) OTS price $10.10

Aircraft Armaments, Inc., Cockeysville, Md.
MECHANIZED FLAME THROWER KIT MODIFICATION.
Final rept. 1 Apr 59-31 July 61,
by T. A. Meehan. 31 Aug 61, 116p. incl. illus.
(Rept. no. ER-2464)
(Contract DA 18-108-405-cml-349)
Unclassified report

DESCRIPTORS: (*Flame throwers, Design, Cupolas, Slip rings, Pressure regulators, Tests.) (*Armored vehicles, Armor plate, Design.) (*Automatic weapons, Guns, Gun mounts, Gun turrets, Tests.)

4. CHEMISTRY

AD-263 127 Div. 4, 25
(TIPSM/EET) OTS price $2.60

Washington U., Seattle.
THE INFRARED SPECTRUM AND THERMODYNAMIC PROPERTIES OF GASEOUS SULFUR TRIOXIDE,
by R. W. Lovejoy, J. H. Colwell and others.
31 Aug 61, 22p. incl. illus. tables (Technical rept. no. 1)
(Contract Nonr-47719, Proj. NR 014-402)
Unclassified report

DESCRIPTORS: (*Sulfur compounds, Oxides, Gases, Molecular spectroscopy, Infrared spectroscopy, Absorption, Spectrographic analysis, Molecular structure, Chemical bonds, Thermodynamics.) (*Sulfur compounds, Oxides, Liquids, Films, Low-temperature research, Molecular spectroscopy, Infrared spectroscopy, Raman spectroscopy.) (*Sulfur compounds, Oxides, Polymers, Gases, Molecular spectroscopy, Spectrographic analysis, Infrared spectroscopy, Absorption, Thermodynamics, Heat of reaction.)

The IR spectrum of SO3 was under prism resolution in both the gaseous state and in Xe matrices at liquid N temperature. In both cases it was found that a satisfactory vibrational assignment of the spectrum of monomeric SO3 could be made on the basis of a simple D sub 3h symmetry model. The IR fundamentals of SO3 in the Xe matrix spectrum were essentially the same as those of the gas phase except the v2(a2'') mode was shifted to 1/464 cm. A normal coordinate treatment of the SO3 molecule was carried out. Potential constants were determined for both Urey-Bradley and simplified valence force fields. Three weak absorption bands of S3O9 were detected in the gas phase spectrum. It was estimated that for the trimerization reaction, the heat of reaction at absolute zero was approximately 30 kcal/mole and K sub p was approximately unity at 298 K. (Author)

AD-263 166 Div. 4
(TIPSM/REB) OTS price $2.60

Naval Research Lab., Washington, D. C.
THE APPLICATION OF AN X-Y PULSED MEASURING SYSTEM TO POLARIZATION STUDIES. PART 1. THE HYDROGEN REACTION ON PLATINUM.
Interim rept.,
by C. H. Presbrey, Jr., and S. Schuldiner.
27 July 61, 22p. incl. illus. tables, 26 refs.
(NRL rept. no. 5616)
Unclassified report

DESCRIPTORS: (*Hydrogen, *Electrochemistry, Chemical reactions, Ionization, Dissociation, Reaction kinetics, Measurement, Instrumentation, Absorption, Platinum, *Electrodes, *Polarization, Electrolytic cells.) (*Pulse generators, Oscilloscopes, Electrolytic cells, Reaction kinetics, Chemical reactions, Resistance, Voltage, Electric currents, Measurement.)

The X-Y pulsed measuring system developed at the Naval Research Laboratory was modified for the study of electrochemical systems. It was possible to determine the electrokinetic parameters of fast reaction steps. Kinetic equations were derived which are applicable to the X-Y pulsed measuring system. An investigation of the H reaction on Pt in acid solution resulted in a quantitative separation and determination of solution resistance, charge on the double layer, and the discharge/ionization reaction step. Experimental results indicated that H atoms were associated with the Pt surface in three ways; some are weakly bonded to the surface; others are strongly bonded; and the residue of H atoms are absorbed in surface layers of Pt. The kinetic analysis showed that only a small number of H atoms are in rapid equilibrium with H2 gas at the equilibrium potential. (Author)

AD-263 172 Div. 4, 14
(TIPSM/SEB) OTS price $1.60

Ionics, Inc., Cambridge, Mass.
PURIFICATION OF ORGANIC COMPOUNDS BY MEMBRANE PERMEATION.
Bimonthly progress rept. no. 1, 1 July-1 Sep 61,
by John L. Eisenmann. 15 Sep 61, 13p. incl. tables, 21 refs.
(Contract DA 18-108-cml-6626)
Unclassified report

DESCRIPTORS: (Organic compounds, Purification, Mixtures, Separation, Solvent action, Diffusion, Semipermeability, *Membranes, *Films.) (Organic compounds, Heptanes, Mixtures, Acetones, Cyclohexanes, Pentanes.) (Films, Plastics, Polymers, Ethylene, Propenes, Styrenes, Acetates, Cellulose, Resins, Chlorides, Vinyl radicals.) (Separation, Diffusion, Pressure, Vapors, Chromatographic analysis.) (Molecules, Ions, Molecular structure, Electron charge.)

Liquid-phase membrane permeation is being studied for use in separating organic mixtures. The investigation will attempt to correlate the effects of operating variables and film composition upon the permeability of molecules of different sizes, shapes, and chemical nature and also to determine the factors most effecting selectivity of films. Thin plastic or polymeric films will be used for the membrane. The removal of the charges which permeates will be effected by reducing the pressure, thus evaporating the material. Vapor phase chromotography is being used for analysis. The following permeation tests were performed successfully: acetone-heptane mixture with cellulose triacetate; heptane-cyclohexane mixture with polyethylene; and n-pentane-n-heptane mixture with polyethylene. Polypropylene was used successfully also. Polystrene, Aclar, Mylar, and Saran were unsatisfactory for permeation of a 50-50 pentane-heptane mixture. A review of the literature is also included.

AD-263 173 Div. 4
(TIPSM/EJH) OTS price $1.10

Noyes Chemical Lab., U. of Illinois, Urbana.
TETRAKIS (p-DIMETHYLAMINOPHENYL) ETHYLENE DIIODIDE AND ITS FREE RADICAL BEHAVIOR,
by D. H. Anderson, R. M. Elofson and others.
23 July 61, 3p. incl. illus. (Technical rept. no. 41)
(Contract Nonr-183413, Proj. NR 051-215)
Unclassified report

DESCRIPTORS: (*Ethylenes, *Iodides, Polycyclic compounds, Heterocyclic compounds, Phenyl radicals, Amines, Methyl radicals, Nitrates, Water, Organic solvents, Chlorides, Solvent action, Complex compounds, Complex ions, Free radicals, Paramagnetic resonance, Chemical reactions.) (*Ethylenes, *Iodides, Phenyl radicals, Methyl radicals, Nitrates, Synthesis.)

Tetrakis-(p-dimethylaminophenyl) ethylene (I) was shaken with $AgNO_3$ in water for 12 hr to produce two dinitrate derivative (II); addition of KI to II in water produced two diiodide derivative (III), brilliant green crystals precipitated from water. Water solutions of II and III showed no E.P.R. signal. In ethylene chloride there was a marked difference between the optical and E.P.R. spectra of II and III. Solutions of II were purple and showed no radical activity; solutions of III were green ang gave an intense E.P.R. signal, corresponding to at least 20% of the material being a free radical. The optical and E.P.R. spectra are the same whether III is dissolved in ethylene chloride or iodine is added to I in ethylene chloride.

AD-263 174 Div. 4, 25
(TIPSM/REB) OTS price $1.60

Noyes Chemical Lab., U. of Illinois, Urbana.
ELECTRON COUPLING OF NUCLEAR SPINS. V. VIBRATIONAL EFFECTS IN CHX GROUPS,
by H. S. Gutowsky, V. D. Mochel, and B. G. Somers. 1 Aug 61, 19p. incl. illus. tables, 25 refs. (Technical rept. no. 42)
(Contract Nonr-183413, Proj. NR 051-215)
Unclassified report

DESCRIPTORS: (*Nuclear spins, Nuclear magnetic resonance, Atomic orbitals, Molecules, Molecular spectroscopy, *Chemical bonds, Electrons, Isotopes, Vibration, Methanes, Deuterated compounds, Protons, Fluorides, Hydrogen.)

A study was made to determine whether vibrational and isotopic effects are of any consequence in the H-H, H-D, H-F, and D-F coupling constants for CH_2, CHD, CHF, and CDF groups. The angular dependence of the proton-proton coupling constant in CH_2 groups between bond angles of 100 and 130 degrees was calculated at 5 degree intervals. The predicted values are larger than those previously observed at small H-C-H angles as well as at large angles. Graphical interpretation indicated that the variation of the coupling constant with bond angle is somewhat non-linear, i.e., the coupling changes more rapidly at smaller bond angles. Vibrational averaging is shown to be independent of temperature for CH_2 and CHD groups. In the study of the angular dependence of H-F coupling in CHF groups an effort was made to detect a difference between samples of C_3F_7H and C_3F_7D. Observations of the F-9 spectra of the 2 compounds at 40 mc revealed no difference.

AD-263 178 Div. 4
(TIPSM/REB) OTS price $8.10

Noyes Chemical Lab., U. of Illinois, Urbana.
THE ELECTROCHEMISTRY OF V_2O_5 IN LiCl-KCl EUTECTIC MELT.
Doctoral thesis,
by D. R. Rhodes. 15 July 61, 75p. incl. illus. tables, 81 refs. (Technical rept. no. 9)
(Contract DA 11-022-ORD-1987, Proj. 1486)
(AROD 1486:17) Unclassified report

DESCRIPTORS: (*Electrolytic cells, Materials, Design.) (*Vanadium compounds, Oxides, Reduction, Lithium compounds, Vanadates, Bronze.) (Alkali metal compounds, Lithium compounds, Potassium compounds, Sodium compounds, Chlorides, Halides, Salts, Melting, Vanadium compounds, Oxides, Solutions, Electrolytes, Electrochemistry, Electrolysis, Reduction, Chemical reactions, Electric potential, Electric currents, Voltage.)

The electrochemistry of V_2O_5 in LiCl-KCl eutectic melt at 450 C was investigated. Results indicated several possible Li vanadates of limited solubility can exist in the melt. Current-voltage curves of V_2O_5 and $NaVO_3$ melt-solutions were obtained with gold-plated Pt microelectrodes. Chronopotentiometry showed 2 reduction steps for V_2O_5 at about the same potentials as those obtained with voltammetry. Constant current electrolysis of a V_2O_5 melt-solution gave an insoluble lithium vanadate bronze and an insoluble lithium vanadate. From potential measurement of a bronze-covered indicator electrode during the electrolysis of a V_2O_5 solution it was concluded that the V_2O_5 was reduced to an insoluble lithium vanadate bronze.

AD-263 329 Div. 4, 25
(TIPSM/EJH) OTS price $1.60

Aerospace Corp., El Segundo, Calif.
BASIC CHEMICAL RESEARCH PROGRAM. ELECTRICAL PROPERTIES OF ORGANIC COMPOUNDS.
Semiannual technical rept. 1 Jan-30 June 61,
by H. H. Takimoto and P. C. Marx. 30 June 61, 7p.
(Rept. no. TDR-594(1201-02)TR-1)
(Contract AF 04(647)594)
Unclassified report

DESCRIPTORS: (*Organic compounds, Solid state physics, Electrical conductance, Conductivity, Electrical properties, Measurement, Electronic equipment, Materials.) (*Organic compounds, Monocyclic compounds, Methanes, Cyano radicals, Quinones, Synthesis.) (*Hydroxides, Benzaldehydes, Synthesis.) Chemical reactions, Condensation reactions. (*Benzenes, Acetylenes, Phenyl radicals, Hydroxides, Amines, Anilines, Benzaldehydes, Phenols, Synthesis.) (*Cyano radicals, Benzenes, Synthesis.) (*Methanes, Phenyl radicals, Alkyl radicals, Hydroxides, Synthesis.)

A basic chemical research program was initiated for the purpose of investigating the process of electronic conduction in organic compounds. The goals of this investigation are the improvement of solid state devices, and the development of new materials with unique electrical properties for application in electronic components. The work was divided into two parts: chemical synthesis of appropriate organic compounds and the measurement of their electrical properties. (Author)

AD-263 364 Div. 4
(TIPSM/EJH) OTS price $6.60

Washington U., Seattle.
STUDIES OF HYDROGEN PEROXIDE: THE INFRARED SPECTRUM AND THE INTERNAL ROTATION PROBLEM,
by R. L. Redington, W. B. Olson, and P. C. Cross.
31 Aug 61, 68p. incl. illus. tables (Technical rept. no. 2)
(Contract N8onr-47719, Proj. NR-014-402)
Unclassified report

DESCRIPTORS: (*Hydrogen compounds, *Peroxides, Deuterated compounds, Molecular spectroscopy, Infrared spectroscopy, Microwave spectroscopy, Spectrographic analysis, Molecular rotation, Molecular structure, Chemical bonds, Electron transitions, Atomic energy levels.)

Several H2O2 infrared absorption bands have been obtained under 1/0.2 cm. resolution. They demonstrate both doubling due to internal rotation and effects due to the inential asymmetry. The ground state rotational constants are found to be: A equals 1/10.068 cm, B equals 0.8740, C equals 0.8384. These parameters indicate a wide dihedral angle for H2O2, as proposed in the following structure: OO bond equals 1.475 A, OH bond equals 0.950 A, dihedral angle equals 119.8 degrees and OOH angle equals 94.8 degrees. The constants are applied to the microwave data for H2O2 and the deuterated species. The ground state splitting is found to be 1/11.44 cm, and this, used with the recently reported torsion at 1/317 cm, yields the barriers hindering internal rotation. They are V sub cis equals 1/1300 cm and V sub trans equals 1/300 cm. A simple correlation of the IR doublings is attempted. (Author)

AD-263 561 Div. 4, 25
(TIPSM/SEB) OTS price $26.00

Beech Aircraft Corp., Boulder, Colo.
DESIGN HANDBOOK FOR LIQUID AND GASEOUS HELIUM HANDLING EQUIPMENT.
Final rept. June 60-May 61,
by V. E. Isakson, I. M. Kroenke and others.
May 61, 524p. incl. illus. tables, 131 refs.
(Contract AF 33(616)7332, Proj. 8119)
(ASD TR 61-226) Unclassified report

DESCRIPTORS: (*Helium, Liquids, Gases, Liquefied gases, Storage, Storage tanks, Handling, Transportation, Safety, Physical properties, Thermodynamics, Hazards, Purification, Vapor pressure, Viscosity, Entropy, Enthalpy, *Handbooks.)

The design handbook provides engineering data concerning methods and equipment to be used for liquid and gaseous helium storage, transport, and transfer systems. Data on the properties and hazards of helium are also presented. The report is divided into three sections covering the requirements of: (1) Liquid helium storage, transport, and transfer methods; (2) Helium liquid to gas conversion; and (3) Gaseous helium storage, transport, transfer, purification, and compression methods. (Author)

AD-263 711 Div. 4
(TIPSM/SEB) OTS price $4.60

Massachusetts U., Amherst.
OPTICAL STUDIES OF THE MORPHOLOGICAL CHANGES IN DEFORMING POLYOLEFINS,
by Richard S. Stein, Marion B. Rhodes and others.
11 Aug 61, 43p. incl. illus. 27 refs.
(Technical rept. no. 37)
(Contract Nonr-335700, Proj. 356-378)
Unclassified report

DESCRIPTORS: (*Polymers, *Ethylenes, Fluorides, Films, *Plastic coatings, Disks, Spheres, Crystals, Stresses, Thermal stresses, Light, Scattering, Refraction, Polarization, *Optics, Electron microscopy, Refractive properties.)

The photographic technique for studying light scattering patterns from polymer films is reviewed. Calculations are presented for the scattering from sphere and disk-like aggregates of crystals of differing polarizabilities, and comparison is made with experiment. The effect of size distribution is considered. The use of the optical diffractometer technique for interpreting scattering pictures is discussed. Comparison of information obtained by light scattering and light and electron microscopy is made. (Author)

AD-263 731 Div. 4, 25, 27
(TIPSP/WH) OTS price $2.60

General Dynamics/Convair, San Diego, Calif.
CATALYSIS OF HYDROGEN ATOM RECOMBINATION. INVESTIGATION.
Sep 61, 19p. incl. illus. (Rept. no. ZJ-060)
Unclassified report

DESCRIPTORS: (*Hydrogen, *Atoms, *Dissociation, *Recombination reactions, *Catalysts, Reaction kinetics, Microwaves, Tungsten, Molybdenum.) (High temperature research, Vacuum systems, Instrumentation, Chemistry.) (Electric arcs, Jets, Propulsion.)

The development of a very potent hydrogen atom recombination catalyst is discussed. A research program is considered which is intended to evaluate a catalyst concept in a range of temperature and pressure conditions considered typical of the downstream portion of a hydrogen atom recombination nozzle associated with electrical arc-jet propulsion units. (Author)

AD-263 733 Div. 4, 25, 27
(TIPSP/WH) OTS price $6.60

General Dynamics/Convair, San Diego, Calif.
HYDROGEN ATOM RECOMBINATION KINETICS PHENOMENA. RESEARCH PROPOSAL.
Sep 61, 64p. incl. illus. tables (Rept. no. ZJ-059)

Unclassified report

DESCRIPTORS: (Gases, *Hydrogen, Atoms, *Reaction kinetics, *Recombination reactions.) (High temperature research, Vacuum, Upper atmosphere.) (Thermal utilization, Propulsion, Recombination reactions.) Free radicals, Molecules.

Gas-phase mechanisms and rates of hydrogen atom recombination in the presence of chemical species under conditions of elevated temperatures and low pressures is to be explored experimentally and theoretically. The information is applicable to basic chemical kinetics theory and the development of thermal propulsion devices. (Author)

AD-263 735 Div. 4
(TIPSM/EJH) OTS price $6.60

Mallinckrodt Chemical Lab., Harvard U., Cambridge, Mass.
STUDIES IN ELECTRON SPIN AND NUCLEAR SPIN RESONANCE SPECTROSCOPY,
by Edward W. Randall. Aug 61, 59p. incl. illus. tables, 34 refs.
(Contract Nonr-186613)

Unclassified report

DESCRIPTORS: (*Aluminum compounds, *Metalorganic compounds, Alkyl radicals, Complex compounds, Electrons, Paramagnetic resonance, Hyperfine structure, Chemical bonds, Molecular structure, Molecular spectroscopy, Nuclear magnetic resonance, Spectrographic analysis.) (*Silanes, *Nitrogen compounds, *Amines, Pyridines, Formamides, Acetamides, Protons, Hydrogen compounds, Chemical bonds, Nuclear magnetic resonance, Spectrographic analysis.) (*Heterocyclic compounds, *Polycyclic compounds, *Titanium compounds, Chlorides, *Aluminum compounds, Alkyl radicals, Paramagnetic resonance, Hyperfine structure, Molecular spectroscopy, Molecular structure.) (*Nuclear magnetic resonance, Measurement, *Spectrophotometers, Instrumentation, Design, Operation.)

Contents:
Electron spin resonance spectroscopy: an investigation of the reaction products of biscyclopentadienyl titanium dichloride with various aluminum alkyls
High resolution nuclear magnetic resonance spectroscopy. Nuclear magnetic double resonance (Results of N-14 chemical shift measurements; discussion of N-14 shifts; and decoupled proton spectra of some amides)
Broad line nuclear magnetic resonance (The RF oscillator; lock-in amplifier and phase detector; modulator; probe; frequency calibration; and integrator)

AD-263 736 Div. 4
(TIPSM/EJH) OTS price $2.60

Mallinckrodt Chemical Lab., Harvard U., Cambridge, Mass.
A CONTRIBUTION TO THE CHEMISTRY OF SILYLAMINES AND SILAZANES,
by Hans Pfleger. Sep 61, 21p. incl. tables, 16 refs.
(Contract Nonr-186613)

Unclassified report

DESCRIPTORS: (*Silanes, *Silicon compounds, *Amines, *Nitrogen compounds, Heat-resistant polymers, Complex compounds, Chelate compounds, Metallic compounds, Heterocyclic compounds, Monocyclic compounds, Chemical bonds, Chemical reactions, Synthesis, Theory.) (Methyl radicals, Silanes, Ethylenes, *Amines, Chlorides, Polymers, *Sulfonamides, *Piperidines, Heterocyclic compounds, Chemical reactions, Synthesis.)

A summary of the preparation and characterization of new compounds containing silicon-nitrogen bonds is presented. This work constitutes a part of the current effort on the synthesis, study, and understanding of silicon-nitrogen polymers. (Author)

AD-263 737 Div. 4
(TIPSM/EJH) OTS price $3.60

Mallinckrodt Chemical Lab., Harvard U., Cambridge, Mass.
COORDINATION OF SILICON-NITROGEN COMPOUNDS,
by Richard Weiss. Sep 61, 25p. incl. tables, 24 refs.
(Contract Nonr-186613)

Unclassified report

DESCRIPTORS: (*Silanes, *Silicon compounds, *Amines, *Nitrogen compounds, *Heat resistant polymers, Polymers, Complex compounds, Chelate compounds, Metallic compounds, Heterocyclic compounds, Monocyclic compounds, Chemical bonds, Electrons, Chemical reactions, Stability, Synthesis, Theory.) (Methyl radicals, *Silanes, Ethylenes, *Amines, Copper compounds, Cobalt compounds, Chlorides, Synthesis.

The purpose of the present study was the preparation of stable coordination compounds from silylamines and silazanes in which all the nitrogen atoms are coordinated to the metal. It was also planned to examine the interaction between silylamines and certain metal salts which lead to forming of silazanes. It was concluded that only chelate compounds with strong donor groups and in which the silicon atom is included in the chelate ring will yield metal coordination compounds which contain silicon and which are stable enough for practical use. (Author)

AD-263 746 Div. 4, 25
(TIPSM/SEB) OTS price $1.60

Mallinckrodt Chemical Lab., Harvard U., Cambridge, Mass.
THE MICROWAVE SPECTRUM AND STRUCTURE OF NSF_3,
by William H. Kirchhoff and E. Bright Wilson, Jr. 1961, 13p. incl. illus. tables, 13 refs.
(Sponsored by Office of Naval Research)

Unclassified report

DESCRIPTORS: (*Fluorides, Sulfides, *Sulfur compounds, Nitrogen compounds, Isotopes, Synthesis, Preparation, Mass spectroscopy, Microwave spectroscopy, Molecular structure, Dipole moments, Quadrupole moments, Determination.)

The action of AgF_2 on S_4N_4 in CCl_4 produces a gaseous compound, NSF_3, whose structure has been in some doubt. Fragments in the mass spectrum

show that the molecular structure is probably as most recently claimed by Glemser (Z. Anorg. U. Allgem. Chem., 284:97, 1956). The microwave spectrum was studied in the region 8,000 to 60,000 mc with a conventional Stark modulated spectrograph. The spectrum has the simplicity and first order Stark effects characteristic of a symmetric top. From lines assigned to the normal and also to the 34S and 15N species occuring in natural abundance, the following set of structural parameters was obtained: d(S-N) = 1.416 Angstroms, d(S-F) = 1.552 Angstroms, and FSF = 94 degrees 2 minutes. This structure is thus confirmed and made quantitative. In addition, the dipole moment was measured and found to be 1.91 ± .03 Debye. The quadrupole coupling constant of the 14N nucleus is +1.19 ± .05 mc. (Author)

AD-263 749 Div. 4
(TIPSM/REB) OTS price $5.60

Indiana U., Bloomington.
STUDIES OF LIGHT WEIGHT ELEMENTS,
by Riley Schaeffer, Louis Ross and others.
31 Aug 60, 51p. incl. illus. tables, 27 refs.
(Technical rept. no. 2)
(Contract Nonr-90814, Proj. NR 052-410)
Unclassified report

DESCRIPTORS: (*Silicon compounds, *Nitrogen compounds, *Silanes, *Amines, Synthesis.) (Deuterated compounds, Silanes, Synthesis, Chemical reactions.) (Silicon compounds, *Hydrogen compounds, Nuclear magnetic resonance, Exchange reactions, Mass spectroscopy.) (*Nickel compounds, Carbonyl radicals, Chemical reactions, *Phosphines, Phosphorus compounds, Fluorides.)

Results are given to show that a volatile Si-N compound, (SiH3NSiH2)3, other than trisilylamine can be isolated from the reaction of silyl chloride and NH3. The compound is thought to be N, N', N'' -trisilylcyclotrisilazane. The proton nuclear magnetic resonance spectra of C2H5I, CH3SiH3, and CH3SiH2I were obtained in CS2 solution with tetramethylsilane added as an internal standard. That of Si2H5I, disilanyl iodide, was observed in the neat state and with Me4Si and as a solution with CC14. Exchange reactions were observed between trisilylamine and trisilylamine-d sub 9 and trisilylamine and silyl chloride-d sub 3. The reaction of (SiH3)3N and DC1 did not indicate that any H exchange occurred during the reaction. Reactions of nickel carbonyl with biphosphines and of PF3 with Ni(CO)4 were also studied.

AD-263 793 Div. 4, 25
(TIPSP/WH) OTS price $2.60

Metcalf Research Lab., Brown U., Providence, R. I.
A KINETIC STUDY OF THE FORMATION AND REACTION OF CN MOLECULES IN SHOCK WAVES,
by W. L. Patterson Jr., and E. F. Greene.
Aug 61, 21p. incl. illus.
(Contract AF 49(638)167)
(AFOSR-1304) Unclassified report

DESCRIPTORS: (*Reaction kinetics, Bromine compounds, *Cyanides, Shock waves, Molecules, Argon.) (Chemical reactions, Gases, Spectrographic analysis, Thermodynamics.) (Thermochemistry, *Pyrolysis.)

The decomposition of gaseous BrCN in shock waves was measured over the temperature range 2500-7000 K by following the light emitted by CN and C2. The rate of the reaction in 1 and 5% mixtures with Ar is given. The subsequent disappearance of CN as determined by both the loss of CN and the formation of C2 is consistent with the reaction 2CN yields C2 + N2. (Author)

AD-263 813 Div. 4, 2
(TIPSP/WH) OTS price $3.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
THE CHEMICAL KINETICS OF THE NORMAL ATMOSPHERE,
by M. H. Bortner. June 61, 29p. incl. tables.
(Rept. no. TIS R61SD122)
Unclassified report

DESCRIPTORS: (*Chemical reactions, *Reaction kinetics, *Atmosphere, *Molecules, Dissociation, Recombination reactions.) Tables.

An interpretation of the chemical kinetics of the normal atmosphere at 100 km was made. Using a complete chemical system, the kinetics of each constituent was studied. Rate constants and concentrations were adjusted until a logical and self-consistent set of data was obtained. In this way, limits were determined for the values of certain rate constants. (Author)

AD-263 857 Div. 4
(TIPSM/EJH) OTS price $1.10

Massachusetts Inst. of Tech., Cambridge.
CHEMISTRY OF BORON.
Status rept. no. 7, 1 Apr-31 May 61,
by F. A. Cotton. 31 May 61, 3p.
(Contract DA 19-020-ORD-4919, OOR Proj. no. 222)
Unclassified report

DESCRIPTORS: (*Boron, *Boron compounds, Complex compounds, Alkyl radicals, Benzenes, Cyanides, Transition elements, Chemistry.) (*Metalorganic compounds, *Sodium compounds, Monocyclic compounds, *Iron compounds, Carbonyl radicals.) (*Metalorganic compounds, Napthyl radicals, *Borines, *Organoboranes, Cyano radicals, Cobalt compounds, Hydrides, Acids.) (*Metalorganic compounds, Phenyl radicals, *Boron compounds, Chlorides.) Chemical reactions, Synthesis.

This report includes: DERIVATIVES OF DIALKYL AND DIARYLBORON CYANIDES, by J. J. Bishop (1961). Attempts to purify and characterize the main product of the reaction between di-alpha-napthylborinic acid and hexacyanocobaltic acid were not successful. PREPARATION AND INVESTIGATION OF COMPOUNDS CONTAINING BORON-TO-TRANSITION-METAL BONDS, by R. A. Schunn (1961). Preparation is reported of NaCpFe(CO)2, where Cp equals pi-cyclopentadienyl. Cp2Fe2(CO)4 was cleaved with a 6% Na amalgam in tetrahydrofuran; a yellow solid was obtained. Solid PC15 was added to (C6H5)2BO(n-C4H9) and fractional distillation of the resultant mixture gave the (C6H5)2BC1 as a water-white liquid. The following attempted preparations were not successful; CpFe(CO)2(B(n-C4H9)2) by reaction of NaCpFe(CO)2 with (n-C4H9)2BC1; CpFe(CO)2(B(C6H5)2 by reaction of NaCpFe(CO)2 with (C6H5)2BC1 in (CH3)2O; and CpFe(CO)2-(B(C6H5)2) by reaction of NaCpFe(CO)2 with (C6H5)2BC1 in petroleum ether.

5. COMMUNICATIONS

AD-263 144 Div. 5
(TIPSP/JSM) OTS price $23.50

Armour Research Foundation, Chicago, Ill.
DATA LINE TECHNIQUES.
1 Apr 61, 458p. incl. illus. tables, 62 refs.
(Contract AF 30(602)2188, Proj. 4519)
Unclassified report

DESCRIPTORS: (*Telephone communication systems, *Multichannel telephone systems, Digital systems, Telephone signals, Data transmission systems.) Frequency shift keyers, Phase shifters, Coding.

The purpose of this contract has been to perform an investigation and study of the techniques and methods necessary for the transmission of digital data over standard telephone circuits in order to establish the basis for an optimum signalling system. This technical report supplies a review of pertinent theoretical material and a survey of wire line digital communication techniques to support suggestions for improving channel utilization. Increased utilization dictates the use of longer code elements in terms of time-bandwidth units, extensive terminal line equalization, and anti-impulse noise techniques. The theoretically optimum encoding-decoding systems based on performance are multilevel differentially coherent PSK (phase shift keyed). (Author)

AD-263 157 Div. 5, 8, 30
(TIPSE/CRJ) OTS price $3.60

Bendix Systems Div., Bendix Corp., Ann Arbor, Mich.
ANTENNA WINDOW: A TECHNIQUE FOR PROPAGATION THROUGH A PLASMA SHEATH.
Interim engineering rept. no. 1, 1 June-1 Sep 61,
by Robert G. DeLosh. 1 Sep 61, 33p. incl. illus.
(Contract AF 33(616)8420)
Unclassified report

DESCRIPTORS: (*Pulse communication systems, Design.) (*Plasma physics, *Magnetic fields, Electromagnetic properties, Electromagnetic fields, Measurement.) (*Microwave probes, Operation, Theory.) (*Shock tubes, Design.) (Electronic circuits, Trigger circuits, Delay circuits, Design.) Superconductors, Communication systems.

Research concerns the study of the electromagnetic properties of a plasma in a magnetic field for the express purpose of finding a solution to the re-entry communications blackout problem. Phase I will consist of measuring absorption and reflection of microwave energy from a slab of plasma permeated by a quasi-stationary magnetic field. Phase II will be a flight test of a magnetic window device on a hypersonic re-entry vehicle and will provide the ultimate test of the magnetic window concept. Present effort was directed toward refining the experimental apparatus and experimental techniques. (Author)

AD-263 325 Div. 5, 30
(TIPSB/MS) OTS price $10.50

Control Instrument Co., Inc., Brooklyn, N. Y.
TYPED PAGE READER.
Final rept., June 57-July 60,
by James T. Krowl. July 60, 135p. incl. illus.
(Rept. no. DEV-7980)
(Contract DA 36-039-sc-74858)
Unclassified report

DESCRIPTORS: (*Reading machines, Design, Construction, Data, Coding, Teletype systems, Circuits, Cameras, Recording devices, Video amplifiers, Video networks, Control systems, Effectiveness.)

The Typed Page Reader, AN/FST-6, is capable of reading upper case letters, numerals, and some punctuation marks in several variations of the Standard Elite type font. Lines must be double-spaced and a one inch margin provided on all sides. Typed characters may be misplaced due to typewriter misalignment. They may be misplaced by as much as 10 degrees in the horizontal and/or vertical direction or they may be tilted approximately 5 degrees without causing appreciable degradation of reading accuracy. Considerable character mutilation and some smudging may be tolerated in portions of characters that are not required or that are of lesser importance in ecognition. However, only a small degree of mutilation is permitted in key areas of characters, such as the opening in letter C or the solid top of letter R. Within the above limitations, copy can be read with an accuracy of approximately 98%. It has been observed that the great majority of reading errors is due to the pronounced overlap charcteristic of the Standard Elite type font. Some of these errors are caused by the overlap itself and others are due to the circuit limitations imposed by the requirements of reading overlapped or touching characters. (Author)

AD-263 338 Div. 5, 8
(TIPSE/DLW) OTS price $3.60

Seattle Development Lab., Minneapolis-Honeywell Regulator Co., Wash.
DEVELOPMENT OF MINIATURE FACSIMILE FREQUENCY STANDARD.
Supplement to Final rept., 1 July 60-30 Apr 61, by David W. Wax. 30 Apr 61, 33p. incl. illus. table.
(Contract DA 36-039-sc-74886)
Unclassified report

DESCRIPTORS: (*Facsimile recording systems, Facsimile equipment, Frequency, Standards, *Miniature electronic equipment, Design.) (*Tuning forks, Oscillators, *Oscillator circuits, Frequency stabilizers, Synchronizers, Design.) (Tuning forks, Frequency shift, Servo systems, Control systems, Tests.) Electronic circuits, Memory devices.

Work was directed toward the study of techniques for synchronizing tuning-fork oscillators. A laboratory evaluation was performed to determine the frequency shift response characteristics of a tuning-fork oscillator. Two frequency control systems, all-electronic and mechanical servo, were studied for possible application to the synchronization problem. The electronic control system was adopted as the best approach following theoretical analysis and successful operation of a synchronizer test setup, using this technique. Development efforts resulted in an improved frequency control circuit and frequency memory circuit. A breadboard model of the complete synchronizer was designed, fabricated, and evaluated. Performance of the breadboard model was well within all specified requirements. (Author)

Division 5-COMMUNICATIONS

AD-263 547 Div. 5
(TIPSE/DLW) OTS price $11.50

Alpha Corp., Richardson, Tex.
POINT-TO-POINT COMMUNICATIONS AUGMENTED 4-WHEELS. Final rept.,
by J. P. Giacoletto. 6 May 61, 151p. incl. illus. tables (Rept. no. AER 128)
(Contract AF 19(604)8019)
(AFCRL-510) Unclassified report

DESCRIPTORS: (*Air traffic control systems, *Radio communication systems, High frequency, Mobile, *Voice communication systems, Sidebands, Antennas, Design.) (Radio equipment, Circuits, Panel boards (Electricity), Teletype equipment, Power supplies, Air conditioning equipment, Telephone communication systems, Design.)

The augmented 4-wheels program was initiated to up-date the capability of the 4-wheels air-transportable, air traffic control system. As regards the HF point-to-point communications part of this system, this meant primarily the addition of single side-band techniques. At the same time, state-of-the-art improvements permitted the selection of much smaller and lighter components with the result that the transmitting and receiving functions are combined in one shelter. Since each radio equipment has four channel capability, as necessary to conform with ambient Aircom practices, two directional antennas are provided to enhance propagation reliability. Ranges up to 2500 miles are expected provided appropriate selection is made of operating frequency and circuit loading. Automatic quick tuning is provided in the proposed system with r-f channels selectable on a 0.1 kc basis. Ten telephone and ten teletypewriter circuits connect to the shelter. The proposed shelter is 84 x 84 x 154 inches in outside dimensions. The system includes primary power units and air conditioning units. Total space requirement for transport is 820 cubic feet. The system weight is estimated as less than 14,000 pounds. (Author)

AD-263 574 Div. 5, 12, 8
(TIPSE/CRJ) OTS price $.50

National Aeronautics and Space Administration, Washington, D. C.
PROJECT ECHO. ANTENNA STEERING SYSTEM,
by R. Klahn, J. A. Norton, and J. A. Githens. Sep 61, 17p. incl. illus. (NASA Technical note D-1137)
(In cooperation with Bell Telephone Labs.)
Unclassified report

Also available from NASA, Wash. 25, D. C., as NASA Technical note D-1137.

DESCRIPTORS: (*Radio communication systems, *Antennas.) (*Satellite vehicles, Tracking, Extraterrestrial radio waves.) (Analog-to-digital converters, Coding, Data processing systems, Data transmission systems.) (*Satellite vehicle trajectories, *Orbital flight paths, Determination.) Electronic circuits, Servo systems.

The Project Echo communications experiment employed large, steerable, transmitting and receiving antennas at the ground terminals. It was necessary that these highly directional antennas be continuously and accurately pointed at the passing satellite. This paper describes a new type of special purpose data converter for directing narrow-beam communication antennas on the basis of predicted information. The system is capable of converting digital input data into real-time analog voltage commands with a dynamic accuracy of ±0.05 degree, which meets the requirements of the present antennas. (Author)

AD-263 617 Div. 5, 6, 12
(TIPSE/DLW) OTS price $5.60

Philco Corp., Philadelphia, Pa.
STUDY AND INVESTIGATION OF ACQUISITION AND TRACKING OF OPTICAL COMMUNICATIONS SYSTEMS. Interim engineering rept. no. 1, 1 June-31 Aug 61,
by R. F. Anderson, W. Altemose and others.
31 Aug 61, 51p. incl. illus.
(Contract AF 33(616)8392)
Unclassified report

DESCRIPTORS: (*Light communication systems, Communications theory, Focusing, Space navigation, Astronautics, Astrophysics, *Optical tracking, Reliability, Tracking.) (*Satellite vehicles, *Spaceships, Moon, Flight paths, Orbital flight paths, Deflection, Gyro stabilizers, Gyroscopes, Torque, Satellite attitude, Mathematical analysis, Probability.)

Research is reported on the study and investigation of acquisition and tracking for two hypothetical, optical, space-communication links. This effort was directed toward establishing requirements and developing the analytic tools necessary for this study. The specific items investigated were: the regions of acquisition and tracking, probability density functions for acquisition regions, target loss-rate, closed loop analysis of gyro-stabilized tracker, and tracker stabilization. The specific regions of acquisition are given for the earth and moon satellites. Mathematical expressions for determing probability densities for acquisition are given. Target loss-rate is given in terms of tracking system parameters. An analysis of the closed-loop performance of a gyro-stabilized tracker also is given. Equations were developed showing the interaction of torques between trackers stabilized by various techniques and the vehicle. Expressions were also developed for determining allowable deflections of the vehicle and tracker due to those torques. (Author)

AD-263 756 Div. 5, 8
(TIPSE/DLW) OTS price $18.00

Burroughs Corp., Detroit, Mich.
HANDBOOK OF OPERATING AND MAINTENANCE INSTRUCTIONS FOR ELECTROGRAPHIC TELEPRINTER MODEL AN/GMH-2(XD-2).
28 Aug 61, 287p. incl. illus. tables.
(Contract AF 30(635)10591)
Unclassified report

DESCRIPTORS: (*Handbooks, *Instruction manuals, *Parts catalogs, *Teletype systems, Installation, Maintenance, Operation, Electronic circuits.)

A handbook is provided which gives information to aid maintenance personnel in installing, preparing for use, operating, maintaining, and repairing the electrographic teleprinter AN/GMH-2(XD-2). The AN/GMH-2(XD-2) is a high-speed (75 to 3000 words per minute) page printer that can be used with many communications systems. The AN/GMH-2(XD-2) receives teletypewriter code, decodes the electronic pulses, and performs either a print function or a control function. These functions produce permanent, smudgeproof printed characters on plastic-coated paper. (Author)

6. DETECTION

AD-263 168 Div. 6, 12
(TIPSE/CRJ) OTS price $11.50

General Electric Co., Schenectady, N. Y.
SATELLITE TRACKING BY RADIO.
Final rept.,
by Roy E. Anderson and others. Aug 61,.152p. incl. illus. tables.
(Contract AF 19(604)4087)
(AFCRL-597) Unclassified report

DESCRIPTORS: (*Satellite vehicles, *Doppler tracking, Tracking.) (*Orbital flight paths, *Satellite vehicle trajectories, Determination, Mathematical analysis.) (Radio signals, Frequency shift, Propagation, Measurement.) (Radio transmitters, Telemetering transmitters, Airborne.) Antennas, Radio receivers, Data processing systems, Direction finding, Radio equipment.

The studies have shown that satellite doppler data from telemetry and single beacon transmitters below 500 Mc will generally not provide accurate data for single station orbit determination due to frequency measurement inaccuracy, frequency instability, and refraction in the ionosphere. Accurate doppler tracking can be achieved if the satellite transmits on frequencies in the upper part of the UHF range or higher, if a very stable oscillator is used in the satellite, and very sophisticated frequency counting and computing techniques are used at the ground stations. If satellite transmitting frequencies below approximately 500 Mc are used, it may be helpful to correct for ionospheric refraction by actual measurement, using 2 widely separated satellite transmitting frequencies. Mathematical techniques for orbit determination using radio frequency data were investigated for closed form methods and an iterative method. Also, experiments were conducted to determine feasibility of obtaining simultaneous azimuth and doppler data using a special type of radio direction finder. (Author)

AD-263 225 Div. 6
(TIPSE/NTM) OTS price $2.60

David Taylor Model Basin, Washington, D. C.
VIBRATION AND TOWING CHARACTERISTICS OF SURFACE-SUSPENDED HYDROPHONE SYSTEMS,
by Chester O. Walton and Mervin M. Merriam.
Aug 61, 21p. incl. illus. (Rept. no. 1558)
Unclassified report

DESCRIPTORS: (*Hydrophones, *Towing cables, *Vibration, Tests, Configuration.) (Acoustics, Measurement, Submarine noise.) (Reduction, Vibration.)

An experimental investigation was conducted to determine the sources and methods of reducing cable vibrations in acoustic measuring systems, to provide information concerning full-scale towing behavior, and to accurately define the towing configuration of such systems. The results of this investigation including comparisons with theory and recommendations for improving towed acoustic systems are given. (Author)

AD-263 326 Div. 6, 8
(TIPSE/CRJ) OTS price $5.60

Antenna Lab., Ohio State U. Research Foundation, Columbus.
THE BISTATIC SCATTERING FROM A CLASS OF LOSSY DIELECTRIC SPHERES WITH SURFACE IMPEDANCE BOUNDARY CONDITIONS.
Rept. on Countermeasures Against Radar Absorbing Materials.
by R. J. Garbacz. 15 Jan 61, 51p. incl. illus.
(Rept. no. 925-5)
(Contract AF 30(602)2042)
Unclassified report

DESCRIPTORS: (*Spheres, Dielectrics, *Electromagnetic waves, Scattering, Surface properties, Impedance.) (Electromagnetic waves, Impedance, Mathematical analysis, Theory.) (*Antiradar coatings, *Countermeasures.) Electromagnetic theory.

A brief theory is presented of modal surface impedances on spherically symmetric geometries using transmission-line techniques. The results are specialized to the case of lossy dielectric spheres for which the modal surface impedances become especially simple. Partial results of a computer program to obtain the bistatic scattering from such a class of spheres are presented in graphical form. (Author)

AD-263 392 Div. 6, 26
(TIPSE/DLW) OTS price $1.60

Servo Corp. of America, Long Island, N. Y.
INDUSTRIAL PREPAREDNESS MEASURE FOR THERMISTOR BOLOMETER INFRARED DETECTORS.
Quarterly progress rept. no. 8, 27 Mar-26 June 61,
by Irving Meltzer. 31 July 61, 11p. incl. tables.
(Rept. no. SCA 10300-RQ-8)
(Contract DA 36-039-sc-81288)
Unclassified report

DESCRIPTORS: (*Infrared detectors, Production, Processing, *Manufacturing methods.) (*Bolometers, Thermistors, Infrared equipment, Design, Tests.) Quality control.

Pilot production assembly of non-immersed bolometers was practically completed. Evacuation and final testing of these units was started and final assembly of the immersed units was continued. (Author)

AD-263 416 Div. 6, 30
(TIPSE/DLW) OTS price $4.60

Block Associates, Inc., Cambridge, Mass.
RESEARCH, DESIGN, AND CONSTRUCTION OF A MISSILE-BORNE RADIOMETER,
by Eugene K. Dana and Frits Zernike, Jr.
31 Oct 60, 20p. incl. illus. (Scientific rept. no. 2)
(Contract AF 19(604)5738)
(AFCRL TN 60-681) Unclassified report

DESCRIPTORS: (*Radiometers, *Rockets, Airborne, Sources, Infrared radiation, Blackbody radiation, Measurement, Instrumentation.) (*Infrared detectors, *Infrared filters, Bolometers, Thermistors, Design, Tests.) Telemeter systems, Calibration, Mounting brackets.

A rocketborne filter radiometer is described

which was designed and constructed to study the infrared spectra of various extended sources. The theory of operation, some specific design considerations, and the problem of making the instrument small, light-weight, and rugged are discussed. (Author)

AD-263 436 Div. 6, 12
(TIPSE/DLW) OTS price $2.60

Naval Research Lab., Washington, D. C.
A SHIPBOARD SATELLITE POSITION DISPLAY,
by H. G. Talmadge, Jr. 7 Aug 61, 23p. incl. illus. tables (NRL rept. no. 5638)
Unclassified report

DESCRIPTORS: (*Satellite vehicles, *Orbital flight paths, *Satellite vehicle trajectories, Position finding, Height finding, Velocity, Identification, *Radar plotting.) (*Television display systems, Cathode ray tube screens, *Data processing systems, Electronic circuits, Shipborne, Design.) Display systems, Coding, Computers, Radar tracking.

A satellite position display is described which will provide shipboard personnel with height, subsatellite position, and related information on up to ten selected satellites. It is assumed that corrected values of the orbital elements for all orbiting satellites will be transmitted weekly to the shipboard installation. Display details are presented, certain possible display configurations are outlined, an initial display proposal is presented, and modifications to produce a preferred display are discussed. In addition to the geographical display, a numerical readout or code reading display of ancillary information is also envisioned. Versatility of the display is such that present positions and height can be shown for satellites selected according to category, and that height, position, velocity, surveillance area, and other information are available for a single selected satellite for any selected past, present, or future moment in time, up to seven days from the present. As a design objective, computer and display will introduce an over-all error not to exceed 60 naut mi in position. (Author)

AD-263 463 Div. 6
(TIPSB/CDW) OTS price $1.10

Science and Tech. Section, Air Information Div., Washington, D. C.
INCREASING RADAR SENSITIVITY.
9 Aug 61, 5p. incl. illus. (AID rept. no. 61-118; Trans. from Photoelectronic Method of Selecting Weak Pulse Signals. Pribory i tekhnika eksperimenta, no. 2: 97-101, Mar-Apr 1961)
Unclassified report

DESCRIPTORS: (Aerial targets, Detection.) (*Radar equipment, radar scanning, Design, Sensitivity, Photomultipliers, Oscillators, Circuits.)

AD-263 478 Div. 6, 1
(TIPSE/DLW) OTS price $3.60

Naval Research Lab., Washington, D. C.
DOPPLER SPECTRAL CHARACTERISTICS OF AIRCRAFT RADAR TARGETS AT S-BAND,
by R. E. Gardner. 3 Aug 61, 34p. incl. illus. 7 refs. (NRL rept. no. 5656)
Unclassified report

DESCRIPTORS: (*Doppler radar, Data, *Radar echo areas, Radar reflections, Radar analysis, *Airplanes, *Jet planes, Airframes, Turbojet engines, Turbine blades, Propeller blades, Measurement, Spectrographic analysis.) (*Radar tracking, S band, *Radar targets, Detection, Radar pulses, Modulation, Sidebands, Tests.) Fourier analysis.

The doppler frequency spectra of propeller-driven and turbojet aircraft were measured at S-band. It was found that there are numerous spectral lines in the doppler return from propeller-driven aircraft resulting from the relative motion of the propellers with respect to the radar. The doppler spectrum can be roughly predicted from a knowledge of the propeller parameters and target aspect. Turbojet aircraft spectra were found to contain a strong modulation sideband due to the engine compressor blades. Doppler velocity noise due to target scintillation was also measured. (Author)

AD-263 500 Div. 6, 12
(TIPSE/DLW) OTS price $7.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
A COMB FILTER FOR USE IN TRACKING SATELLITES,
by Richard L. Vitek. Aug 61, 75p. incl. illus. 25 refs. (BRL memo. rept. no. 1349)
(ARPA Satellite Fence Series no. 24)
Unclassified report

DESCRIPTORS: (Transducers, *Radiofrequency filters, Narrowband, Radar interference, Reduction, Electronic circuits, Design, Tests.) (*Satellite vehicles, *Radar tracking, Detection, Doppler radar, Radar equipment.) (Radar signals, Doppler systems, Signal-to-noise ratio, Radar receivers, Measurement.) (Radar antennas, Radar scanning, Radiofrequency filters, Test methods, Simulation.)

The design and evaluation is presented of a 180 element comb filter. This unit was developed in conjunction with the ARPA satellite fence program for the detection and tracking of non-radiating satellites. The primary purpose of this comb filter is to detect and measure the frequency of short duration doppler signals in the presence of noise. The filter elements have a bandwidth of 10 cps and are spaced 20 cps apart to cover a 3800 cps frequency range. A multiple pen analog recorder is used to record individual filter outputs. The evaluation includes data on simulated as well as actual satellite signals. (Author)

AD-263 517 Div. 6, 8
(TIPSD/WH) OTS price $7.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
PRIMARY RECORDING INSTRUMENTATION FOR RE-ENTRY PHYSICS PROGRAM,
by E. J. Peters. 20 Feb 61, 63p. incl. illus.
(Rept. no. 21G-0006)
(Contract AF 19(604)7400)
Unclassified report

DESCRIPTORS: (*Digital systems, Instrumentation, Radar pulses, Radar signals, Radar ranges, Radar receivers, Coding.) (*Re-entry vehicles, Radar tracking). Ultra high frequency, X band, S band, Electronic circuits.

The digital primary instrumentation equipment for the Reentry Physics Experiment being conducted near Wallops Island, Virginia, is described. (Author)

AD-263 571 Div. 6, 15, 30
(TIPSP/MFA) OTS price $15.50

Electronic Systems Lab., Mass. Inst. of Tech., Cambridge.
SEQUENTIAL ANALYSIS WITH APPLICATIONS TO RADAR DETECTION,
by John Proakis. Aug 61, 128p. incl. illus.
(Rept. no. ESL-R-116)
(Contract AF 33(616)7700)
Unclassified report

DESCRIPTORS: (*Radar, *Detection, Statistical analysis, *Sequential analysis, Statistical processes.) (Probability, *Functions, Theory, Equations, Integration, Integral transforms, Bessel functions.) (Communications theory, *Information theory, *Radio signals, Signal-to-noise ratio.)

The sequential method of statistical inference is applied to the detection of signals usually encountered in radar. The advantage of the sequential method of statistical hypothesis testing in making, on the average, faster decisions (concerning the presence or absence of a signal) that the classical fixed-sample method received extensive treatment. A disadvantage exists in the sequential method because the length of any particular test (a random variable) may be quite large even though the average length of the test procedure is small. Since both decision time and memory space are of importance, the truncation of a long sequential test is necessary. The choice of the truncation stage requires some knowledge of the probability distribution functions of the test length n -- at least knowledge of the mean and variance of n. This study provides probability distribution functions and/or moments of the sequential test length when the signal at the radar receiver is a sinusoid corrupted by narrow band Gaussian noise. Both continuous and quantized signal parameters are considered; in particular, signal quantization to two levels is treated extensively. As a result of signal quantization, an information loss occurs which increases the mean and variance of the test length. (Author)

AD-263 622 Div. 6
(TIPSB/LH) OTS price $3.60

Straza Industries, El Cajon, Calif.
DESIGN, DEVELOPMENT AND CONSTRUCTION OF ONE ELECTROLUMINESCENT SONAR DISPLAY.
Quarterly interim development rept. no. 1, 1 June-1 Sep 61,
by A. D. Gomez. 1 Sep 61, 33p. incl. illus.
(Contract NObsr-85430)
Unclassified report

DESCRIPTORS: (*Display systems, *Sonar, Sonar equipment, Luminescence, Photoconductivity, Electronic equipment, Design, Construction.)

The purpose of this program is to design, develop and construct one (1) prototype solid state sonar display device. The display device will employ the phenomenon of electroluminescence and photoconductivity in a layerized method of construction. Progress during this period is related to improvement of the stability and reliability of the constituent layers in the display device. Due to the fact that this display was conceived and constructed during a company sponsored program, a great deal of the technology necessary for fabrication has been created and tested, but each of the layers of the display interacts with adjacent layers hence better and more detailed testing is being done. During this period, properties of the glass substrate, NESA coating (stannic oxide) and preliminary design of both the display and the supplementary electronic equipment was begun. Results of some of the tests are incomplete at this time and will be included in later reports. (Author)

AD-263 878 Div. 6, 2, 20
(TIPSP/GRW) OTS price $4.60

Century Geophysical Corp., Tulsa, Okla.
EVALUATION OF A PRESSURE DETECTOR AS A DEEP WELL SEISMOMETER.
by Robert A. Broding and Daniel P. Hearn.
23 Aug 61, 20p. incl. illus. (Rept. no. P-4-61-2)
(Contract AF 19(604)8454; Proj. Vela Uniform)
(AFCRL-865; ARPA Order no. 180-61, Task 2)
Unclassified report

DESCRIPTORS: (*Underground explosions, Nuclear explosions, Detection.) (Detectors, *Transducers, Piezoelectric transducers, Recording equipment, Test equipment, Tests.) (Pressure, *Seismic waves, Seismographs, Sensitivity.)

The analysis was conducted to evaluate the use of a pressure sensor as a seismic detector for deep hole detection of underground nuclear explosions. (Author)

AD-263 879 Div. 6, 12
(TIPSE/CW) OTS price $19.75

General Dynamics/Astronautics, San Diego, Calif.
AZUSA TRANSPONDER TYPE C, ASSOCIATED TEST EQUIPMENT, AND SUPPORT DOCUMENTS.
Final engineering rept., 1 Jan 58-15 May 61, 15 July 61, 1v. incl. illus. tables, 16 refs.
(Rept. no. AE60-0703)
(Contract AF 08(606)2400)
(AFMTC TR 61-18) Unclassified report

DESCRIPTORS: (*Guided missiles, Underwater to surface, Surface to surface, *Radar equipment, *Radar beacons, Airborne, Design, Test methods.) (*Radar tracking, Test equipment, Circuits.) (*Guided missile personnel, Maintenance personnel, Training, Operation, Maintenance.)

This report describes the development of the Azusa Type C Transponder, special test equipment, test programs, product field support, service engineering training programs, and transponder performance. A brief discussion of the circumstances which led to the program is included. A list of technical personnel and approximate amount of time utilized on the program are presented. Tests, equipment used, and test set-ups are explained and supported by graphs and test data. A history of early transponders, with a pictorial comparison, shows the progress in transponder development. The relationship of the transponder to the Azusa system is discussed along with a detailed discussion of the transponder operation. The development of the electronic design of each of the subassemblies is presented, together with the problems encountered and their solutions. Subassembly principles of operation, analysis, and their mutual relationships are given. Problems associated with progress of the project are covered; associated publications relating to original schedules are referenced. Field service programs are outlined together with a resume of transponder performance. (Author)

7. ELECTRICAL EQUIPMENT

AD-263 382 Div. 7
(TIPSB/MS) OTS price $1.60

Nicad Div., Gould-National Batteries, Inc., Easthampton, Mass.
VENTED NICKEL-CADMIUM E-41 ALARM BATTERY (DEVELOPMENT MODELS).
Supplementary rept. for 1 Aug 60-31 Mar 61, on The Life Cycle Testing of Vented Nickel-Cadmium Batteries for the E-41 Alarm,
by Stanley Januszkiewicz. 31 Mar 61, 41p. incl. illus. table.
(Contract DA 36-039-sc-85273)
Unclassified report

DESCRIPTORS: (*Toxic agent alarms, *Storage batteries, Gas detectors, Battery compartments, Miniature electrical equipment, Alkaline cells, Power supplies, Nickel, Cadmium, Design, Tests, Vibration, Shock resistance, Acceptability.)

A cycling unit was designed and built to perform the life cycle tests on the E-41 alarm battery. Considerable electrical trouble was experienced with the motor generator charging source. The initial battery capacities were lower than expected from our previous acceptance test data. This was traced to insufficient overcharge of the positive plate. In view of the fact that the attainment of complete charge of the positive plates after the capacity cycle could not be readily accomplished by extending the constant potential current. The batteries successfully passed the two hundred (200) charge - discharge cycles. (Author)

AD-263 388 Div. 7
(TIPSM/LK) OTS price $2.60

Diamond Ordnance Fuze Labs., Washington, D. C.
PROPERTIES OF FLAT NICKEL-CHROMIUM FILM RESISTORS,
by William E. Isler. 26 June 61, 28p. incl. illus. tables, 12 refs. (DOFL Rept. no. TR-948)
(Proj. 90291)
Unclassified report

DESCRIPTORS: (*Resistors, Films, Thin films, Metal films, Preparation.) (Metallic smoke deposits, Nickel alloys, Chromium alloys, Silicon compounds, Monoxides, Heat treatment, Resistance, Stability, Measurement, Tests.) (*Electronic circuits, Resistors, Transistors, Diodes, Capacitors.)

Vacuum-deposited resistors with values ranging from 35 to 4700 ohms per sq in. were prepared and studied. The resistors were made by first depositing a layer of Ni-Cr alloy on glass substrates and then a protective layer of SiO. Heating at 250 C for 10 min caused the values of the resistors to increase by 95% for the thinnest films and by 0.3% for the thickest. A shelf-life study of the test resistors showed most of them to be stable with ± 10% over a period of more than 3000 hr of storage at room temperature; for the same resistors, the change due to storage in air at 70 C for 2900 hr ranged from 4.5 to 27%. It was found that reproducible resistors were more readily obtained when the end contacts or electrodes were deposited over the resistor films than when this procedure was reversed. Power capacities up 1.7 w/sq cm were measured. Excluding annealing effects, the values of temperature coefficient of resistance varied from +4 to +220 ppm/ degree C. It is concluded that the resistors are adequate for certain circuit applications; however, with respect to power capacity, certain limitations must be taken into account. (Author)

AD-263 422 Div. 7
(TIPSM/REB) OTS price $10.50

Edison, Thomas A., Inc., West Orange, N. J.
HIGH CAPACITY VENTED NICKEL-CADMIUM CELLS.
Rept. no. 4 (Final) 30 Nov 59-30 Nov 60,
by Edward C. Kopper, W. Ralph Miller and others.
30 Nov 60, 139p. incl. illus. tables.
(Contract DA 36-039-sc-84555)
Unclassified report

DESCRIPTORS: (*Storage batteries, *Alkaline cells, Nickel electrodes, Cadmium, Design, Manufacturing methods, Tests, Electric currents, Electric potential.) (Battery separators, Cellulose, Nylon, Impregnation, Nickel compounds, Nitrates, Cobalt.) (Electrolytes, Lithium compounds, Potassium compounds, Hydroxides.)

The development of 6 sizes of high capacity, vented Ni-Cd cells to meet Signal Corps Requirement SCL-7505A and the manufacture of 300 cells of each of the 6 sizes was completed. All cells were given 3 conditioning cycles during which the capacity at the 5-hr (0.2C sub 5) rate was determined for each cell. Capacity tests were made on 6 representative cells of each type at the 0.2C sub 5 rate at 80 and -40 F and at the 3C sub 5 rate at 80 F. Preliminary tests on 36 Type 4 test cells led to the selection of positive plates 0.044-in. thick, negative plates 0.037-in. thick, a nylon taffeta/cellophane/nylon taffeta separator 5-to 6-mil thick. Vacuum impregnation was used for both positive and negative plates and Co (about 5% on total metal basis) was added to the positive impregnation bath. LiOH (ca. 9 g/l) was added to the KOH electrolyte to promote initial capacity and possibly increase cycle life. (Author)

AD-263 428 Div. 7, 8, 9, 15
(TIPSP/WLH) OTS price $2.60

Cruft Lab., Harvard U., Cambridge, Mass.
APPLICATION OF MATRIX METHODS TO THE OPTIMUM SYNTHESIS OF MULTIVARIABLE SYSTEMS SUBJECT TO CONSTRAINTS,
by Kumpati S. Narendra and Roger M. Goldwyn.
15 June 61, 23p. incl. illus. (Technical rept. no. 342)
(Contract Nonr-186616, Proj. NR 372-012)
Unclassified report

DESCRIPTORS: (*Communications theory, Servomechanism, *Information theory, Control systems, *Electronic systems, Signal-to-noise ratio, Feedback.) (Equations, *Integral equations, *Fourier analysis, Integral transforms.)

Matrix methods are used to extend well-known concepts in single variable systems to the case of systems with several inputs and outputs. The analysis of such multivariable systems, when subjected to random inputs, is considered in the time and frequency domains. Constraints are set up in terms of bandwidth and saturation - as logical extensions of the single variable case - for multivariable systems, and the physical significance of such constraints is discussed. Using the matrix relations obtained, a vector integral equation of the Wiener-Hopf type is derived by minimizing a generalized mean square error. The effect of constraints on the minimization procedure is studied using variational methods. (Author)

AD-263 447 Div. 7, 26, 8
(TIPSE/DLW) OTS price $4.60

International Resistance Co., Philadelphia, Pa.
RESISTORS, FIXED FILM TYPE GENERAL PURPOSE.
Quarterly progress rept. no. 7, 1 Jan-31 Mar 61,
by Jerome G. Burns. 31 Mar 61, 43p. incl. illus. tables.
(Contract DA 36-039-sc-81283)
Unclassified report

DESCRIPTORS: (*Fixed resistors, Production, Processing, *Manufacturing methods.) (Industrial plants, Machines, Molding, Cutting tools, Test equipment, Operation.) (Resistors, Filament wound construction, Films, Coatings, Epoxy resins, Temperature, Tests.)

Test results from matrix #1 reveal that the RC20 unit passes all tests except 175 C no-load. Moisture cycle failures were traced to improper test fixturing. The fixturing was revised and subsequent moisture cycle tests showed that the failures assignable to test fixturing were eliminated. The maximum limit for unspiralled ranges that will meet temperature coefficient requirements is 5000 ohms. Significant improvements were made to the drawing, sandblast, and gas flow control stations of the filament machine. The roller overcoating machine operated satisfactorily. The RC20 unit was molded with excellent results. A mechanism of failure study was initiated to determine the reason for erratic performance during the 175 C no-load test. Preliminary results reveal that stresses caused by mold jacket shrinkage may be detrimental to performance. (Author)

AD-263 584 Div. 7
(TIPSP/WH) OTS price $5.60

Naval Ordnance Lab., White Oak, Md.
LINEAR LUMPED PARAMETER ANALYSIS OF SYNCHROS V. SYSTEMS CONTAINING CONTROL SYNCHROS,
by G. H. Weiss and J. H. Rosenbloom. 31 July 53, 51p. incl. illus.
(NAVORD rept. no. 2570)
Unclassified report

DESCRIPTORS: (*Electric servomechanisms, *Electrical networks, Design, *Impedance, Electrical properties, Transformers.) (Control systems, Analysis, Electrical engineering, Synchros.)

The theory of synchro systems is investigated. Properties of interest, especially accuracy, for synchro control systems both loaded and unloaded with a wye in parallel are treated. Formulas for these properties given in terms of the impedances are applied to design cases: a simple control system with a loaded transformer rotor, n wyes in parallel, and a load in parallel consisting of n transformers with loaded rotors. The cases are solved by a technique employing equivalent circuits.

AD-263 703 Div. 7, 26
(TIPSE/DLW) OTS price $1.60

Elco Corp., Philadelphia, Pa.
INDUSTRIAL PREPAREDNESS MEASURE FOR TYPE "T" LOW POWER, MINIATURE CONNECTORS.
Quarterly progress rept. no. 4, 27 Mar-27 June 60,
by Herman Gordon. 27 June 60, 13p. incl. illus.
Unclassified report

DESCRIPTORS: (*Electric connectors, *Miniature electrical equipment, Tools, Test equipment, Industrial equipment, Industrial production, Design.)

The production techniques and tooling were developed to the point necessary for pilot production. A second look at the connectors was taken to evaluate how well the design tasks were achieved and to determine if there are further design considerations that could be given to a connector of this type. (Author)

AD-263 818 Div. 7
(TIPSE/MS) OTS price $2.60

General Electric Co., Syracuse, N. Y.
RESEARCH AND DEVELOPMENT ON THERMOCOUPLE ENERGY CONVERTERS.
Quarterly progress rept. no. 1, 12 Apr-12 July 61 on Phase 2,
by W. J. van der Grinten. 15 Aug 61, 27p. incl. illus. tables.
(Contract DA 30-069-501-ORD-3294, Proj. TN2-8106; Continuation of Contract NObs-78403, General Electric Co., Schenectady, N. Y., Contract AF 33(616)5281 and General Electric Co., Utica, N. Y., Contract DA 30-069-501-ORD-2855)
Unclassified report

DESCRIPTORS: (*Thermocouples, Semiconductors, Lead compounds, Tellurides, Materials, Casting, Ceramic materials, Design, Measurement, Manufacturing methods.)

Research concerns the development techniques for fabricating, in quantity, good quality n- and p-type thermoelectric lead telluride cells, and the assembling of these cells to form two thermoelectric devices which will meet military requirements. Attention has been focused entirely on the fabrication and some measurements aspects of thermoelectric lead telluride cells. Zinc conjunction with a brazed seal to be fabricated later, a new simple casting technique for the filling of elements has been successfully developed. Subject to experimental verification of electrical output values under prescribed operating conditions, this new filling technique promises to yield excellent n-type elements. On the other hand the reduction of possible contact resistances of p-type elements may require additional attention. (Author)

AD-263 861 Div. 7, 25, 26
(TIPSE/DLW) OTS price $3.60

Armour Research Foundation, Chicago, Ill.
INVESTIGATION OF SINGLE ENERGY GAP SOLAR CELL MATERIAL.
Technical summary rept. no. 2, 1 Jan-30 June 61,
by Robert J. Robinson. 30 June 61, 33p. incl. illus. (Rept. no. ARF 1175-10; Periodic rept. no. 4)
(Contract DA 36-039-sc-87381)
(ARPA Order no. 80-61) Unclassified report

DESCRIPTORS: (*Solar cells, *Power supplies, Single crystals, Materials, *Manufacturing methods, Production, Design.) (Semiconductors, Crystals, Cadmium compounds, Tellurides, Intermetallic compounds, Diffusion, Zone melting, Processing, Electrical properties, Optics, Thermal stresses, Controlled atmospheres, High temperature research, Tests.)

Emphasis was placed on forming p-type layers on

n-type zone leveled CdTe by vapor diffusion in the recently acquired multiple zone fabrication furnace. Low temperature diffusion fabrication studies were emphasized and it is shown that shallow and deep junctions can be formed at 500 C. Electrical, thermal and optical studies of the n-type base material, and spectral response curves of the completed solar cells are included. Combined optical transmission and spectral response curves show that the absorption coefficient versus wavelength has a slope similar to silicon rather than to GaAs or InP which is favorable. Low temperature fabrication is shown to be possible and is advanced as an argument for CdTe since less fabritation disorder is expected compared to high temperature fabrication. However, the room temperature conversion efficiencies of current CdTe solar cells are still low compared to silicon, but the still early state of the art of CdTe is stressed. Preliminary high temperature photovoltaic experiments tend to confirm the use of CdTe compared to silicon. (Author)

AD-263 894 Div. 7, 8, 26
(TIPSE/CW) OTS price $5.60

International Resistance Co., Philadelphia, Pa.
RESISTORS, FIXED FILM TYPE GENERAL PURPOSE.

Quarterly progress rept. no. 8, 1 Apr-30 June 61, by Jerome G. Burns. 30 June 61, 54p. incl. tables.
(Contract DA 36-039-sc-81283)
Unclassified report

DESCRIPTORS: (*Fixed resistors, *Resistors, Manufacturing methods, Materials, Films, Coatings, Oxidation, Inhibition, Molding materials, Molding, *Reliability.)

Further experimentation on filament performance has provided additional proof that performance is tolerant to deposition parameters and that an interaction between the film, termination, or protective system causes the differences in performance. Results of an experiment comparing CP40D to CPHS indicate that the contribution of termination to the performance of critical range units is small. Comparison of overcoats PC29 and PC33 showed similar performance, except for moisture polarization and opens. In these instances, PC29 was superior. In comparing mold powders, XM1127 showed better performance than DAP5201 on 175 C no-load and 100 C load-life; but on moisture cycle, DAP5201 was better. RC20 base-range resistors (500 to 5000 ohms) were subjected to preproduction testing. All ranges exceeded the number of defectives allowable on one or more tests. This pre-production run is being repeated and the units are now on test. A new mold powder and a new CP are being evaluated to improve 175 C no-load. (Author)

8. ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-263 107 Div. 8, 25
(TIPSM/BRW) OTS price $7.60

Westinghouse Electric Corp., Baltimore, Md.
PHOTOEMISSION SOLAR ENERGY CONVERTER.
Semiannual rept. no. 3, 11 July-31 Dec 60.
1 Jan 61, 72p. incl. illus. tables (Rept. no. 9462)
(Contract DA 36-039-sc-85248, Proj. 3A99 09 001 03)
(ARPA Order no. 80-59)
Unclassified report

DESCRIPTORS: (Phototubes, Photoelectric transducers, *Photoemission, *Solar energy, Electric power production, Generators, Power supplies, Electricity, Space flight, Electron tubes, Photoelectric materials.) (*Cesium electron tubes, Design, Processing, Manufacturing methods, Tests, Photoelectric effect.) (Spaceships.)

The use of photoemission to convert solar photon flux into electrical power and the development of a high power-per-unit-weight photogenerator suitable for use in space, are considered. Experimental results obtained with the movable-anode WX-3964 are presented and show how efficiency depends on anode-to-photocathode spacing. The results of the bell-jar and WX-4220 phototube experiments are given, showing the necessity of clean tube components and the desirability of a small volume during cesiation. A tentative design of a glass-tubing processing system is discussed and the design of the WX-4209 is given, showing the compatibility of the two. (Author)

AD-263 112 Div. 8, 25
(TIRSE/DLW) OTS price $5.60

David Sarnoff Research Center, Princeton, N. J.
RESEARCH IN ELECTRON EMISSION FROM SEMICONDUCTORS.
Quarterly rept. no. 3, 1 Apr-30 June 61,
by R. E. Simon, W. E. Spicer, and others.
30 June 61, 49p. incl. illus. (Rept. no. 11)
(Contract DA 36-039-sc-87388, Proj. 3A99-13-001-01)
Unclassified report

DESCRIPTORS: (*Semiconductors, *Thermionic emission, Field emission, *Photoemission, Measurement.) (Silicon, Cesium, Germanium, Materials, Surface properties, Electrons, Scattering, Analysis.) (Crystals, Electrodeposition, Heat treatment, Surfaces, Processing.) Electron optics, Theory.

Theoretical and experimental studies are reported in the area of electron energy loss interactions and surface effects in semiconductors. These include a theoretical investigation of electron-electron interactions in semiconductors, velocity distribution measurements of photoelectrons from cesium treated silicon, studies of the effect of heat treatment on crystals as as function of etching procedure, studies of the effect of controlled deposition of cesium on unclean silicon surfaces, measurements of photoemission from silicon crystals cleaved in vacuum and treated with cesium. In addition, the first attempts to produce materials for large area germanium hot electron emitters are described. (Author)

AD-263 116 Div. 8, 25
(TIPSE/DLW) OTS price $10.50

Stanford Electronics Labs., Stanford U., Calif.
ELECTRON DEVICES RESEARCH.
Consolidated quarterly status rept. no. 18, 1 Apr-30 June 61.
30 June 61, 119p. incl. illus. table.
(Contracts DA 36-039-sc-73178, DA 36-039-sc-85387, AF 33(616)7944, AF 19(604)5480, AF 49(638)660, Nonr-22540, Proj. NR 373 370, and Nonr-22524, Proj. NR 373 360)
Unclassified report

DESCRIPTORS: *Electron tubes, *Plasma physics, Ion beams, *Masers, Microwave amplifiers, Amplifiers, Broadband, Theory, Microwave equipment, Electron beams, *Parametric amplifiers, Electron guns, Noise (Radio), Photons, Backward-wave amplifiers, Ferromagnetic materials, Radiofrequency filters, Traveling waves tubes, Scientific research.

AD-263 119 Div. 8, 30
(TIPSE/RD) OTS price $6.60

Syracuse U., Research Inst., N. Y.
TIME RESPONSE CHARACTERISTICS OF LINEAR NETWORKS AND TRANSFORMATION METHODS IN NETWORK SYNTHESIS.
Final rept., Pt. 1,
by John D. Brule and Richard A. Johnson. Aug 61, 65p. incl. illus. tables (Rept. no. EE745-6109F1)
(Contract AF 19(604)6142)
(AFCRL 186, pt. 1) Unclassified report

DESCRIPTORS: (*Electrical networks, *Electronic circuits, *Linear systems, Synthesis.) (Memory devices, Analog computers, *Data processing systems, Electric filters.) (Polynomials, Numerical analysis, Sampling, Transformations (Mathematics).) Mathematical prediction.

The effects of linear networks on various types of signals, and approximation methods are considered. A systematic means is discussed to change a given rational transfer function such that its impulse response approximates a given time function with reduced integral squared error. Transformation methods are presented that are of use in network synthesis. In many problems of interest, a time domain representation of the networks under consideration may yield a better insight into the characteristics desired than a frequency domain representation. For example, in polynomial extrapolation of sampled data it is useful to consider the extrapolation process as a finite memory filter operating on the input data. The output of this filter is most readily studied by considering its time domain characteristics, rather than its frequency domain representation. The time domain representation is exploited herein when the input signal is deterministic, and also when it is described in terms of an autocorrelation function. Much of the work that is done is concerned with finite memory filters, and a study in the time domain is found to be most useful in this case. (Author)

AD-263 179 Div. 8, 6
(TIPSE/CRJ) OTS price $3.60

Istituto Universitario Navale, Naples (Italy).
RADAR CORNER REFLECTORS FOR LINEAR AND CIRCULAR POLARIZATION.
Technical note no. 3 on Theoretical and Experimental Research on Absorption, Transmission and

Radiation of Electromagnetic Waves,
by G. Latmiral and A. Sposito. 15 July 61, 31p. incl. illus. table.
(Contract AF 61(052)36)
(RADC TN 61-190) Unclassified report

DESCRIPTORS: (*Radar corner reflectors, Design, Italy, Polarization.) (*Radar reflections, Radar signals, Polarization.) Electromagnetic theory, Mathematical analysis. (Electromagnetic waves, Absorption, *Wave transmission.)

When a grid of parallel wires is put in front of a plane or corner reflector, interesting effects of polarization conversion can be obtained. These effects may be used to construct trihedral corner reflectors which, contrary to the normal ones, are radarvisible even with circular polarization. (Author)

AD-263 205 Div. 8
(TIPSE/DSW) OTS price $4.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
REVIEW OF CYLINDRICAL SURFACE WAVE TRANSMISSION LINES,
by Leo Birenbaum. 11 Jan 61, 44p. incl. illus. table, 30 refs. (Research rept. no. PIBMRI-882-60)
(Contract DA 36-039-sc-85321, Proj. 3A99-15-001-06)
Unclassified report

DESCRIPTORS: (Electromagnetic waves, Wave transmission, *Microwaves, Propagation, Attenuation, Electromagnetic fields, Electrical properties, *Transmission lines, Measurement, Mathematical analysis.) (*Waveguides, *Dielectric films, Rods, Coaxial cables, Electric cables, Dielectrics, Effectiveness, Design.)

Information is presented on the transmission properties of dielectric rod waveguide, dielectric image line, and dielectric-coated wire (or Goubau wire) guide. Data is given for: guide wavelength, attenuation, field extent, higher modes, radiation from bends, field patterns, and means of exciting the guides. For the dielectric-coated wire, several examples are included showing how to select guide dimensions by means of design charts. Most of the data was taken from the selected bibliography of thirty references and is intended to be comprehensive and up-to-date. (Author)

AD-263 266 Div. 8
(TIPSE-DLW) OTS price $3.60

Electronic Systems Lab., Mass. Inst. of Tech., Cambridge.
AN EXPERIMENTAL INVESTIGATION OF NOISE IN TUNNEL DIODES,
by Carl N. Berglund. July 61, 33p. incl. illus. (Rept. no. ESL-R-115)
(Contract AF 33(616)5489)
Unclassified report

DESCRIPTORS: (*Diodes, Noise (Radio), Silicon Germanium.) (*Noise (Radio), Measurement, Mathematical analysis.) (Radiofrequency, Frequency, Temperature, Voltage, Test methods, Tests.)

Noise measurements were made on 1 silicon and 3 germanium commercially available tunnel diodes over a bias range from zero voltage to a voltage slightly beyond the valley point, and at three temperatures--203 K, 290 K, and 373 K. Frequency-dependent noise was measured in the range 1 kc to 500 kc, and was found to increase with increasing bias voltage for each sample. The observed noise at each bias point varied nearly inversely as the frequency to some power x, where x ranged from 0.46 to 1.2. Frequency-independent noise was measured at 30 mc at room temperature. It was found that the equivalent shot-noise current of a tunnel diode at voltages above the peak-point voltage is given very closely by the observed direct current. From zero voltage to the peak-point voltage, the equivalent shot-noise current of a tunnel diode is approximated by the sum of the magnitudes of the Esaki and Zener currents. (Author)

AD-263 267 Div. 8, 2, 12
(TIPSP/GRW) OTS price $5.60

Electromagnetic Research Corp., College Park, Md.
DETERMINATION OF IONOSPHERE PARAMETERS BY MEANS OF A SATELLITE ANTENNA-TYPE PROBE. III. PERTURBATION ANALYSIS AND ADMITTANCE MEASUREMENT SYSTEM,
by W. W. Zachary, E. A. Wolff, and M. Katzin. 30 June 61, 54p. incl. illus. (Scientific rept. no. 3; Rept. no. CRC-6656-3)
(Contract AF 19(604)6656)
(AFCRL-849) Unclassified report

DESCRIPTORS: (*Ionosphere, Physical properties, *Re-entry aerodynamics, *Satellite vehicle antennas.) (Antennas, Space probes, Magnetic effects, Terrestrial magnetism.) (Sidebands, Impedance, Measurement, Mathematical analysis.) (Integral equations, Green's function, Perturbation theory.)

A spherical antenna-type probe was analyzed for use in determining the parameters of the ionosphere by means of the reaction of the medium on the antenna admittance. The effect of the anisotropy of the medium which is produced by the earth's magnetic field is evaluated by a perturbation technique. This is accomplished by separating the the conductivity tensor into a scalar plus an anisotropic part, both of which depend on the terrestrial magnetic field. The integral equation which results from a Green's function solution is approximated by the isotropic Green's function. With this approximation, it is possible to carry out all the necessary integrations to obtain the field components. The input admittance then can be evaluated in terms of known functions. A system proposed for the measurement of input admittance was refined by the application of single sideband modulation techniques. (Author)

AD-263 277 Div. 8
(TIPSE/CRJ) OTS price $14.00

New Mexico U. Engineering Experiment Station, Albuquerque.
PROPAGATION BETWEEN CONDUCTING AND NONCONDUCTING MEDIA,
by Richard H. Williams. Sep 61, 202p. incl. illus. tables, 23 refs. (Rept. no. EE-50)
(Contract Nonr-279801)
Unclassified report

DESCRIPTORS: (*Electromagnetic waves, *Propagation, Air, Sea water, Theory, Mathematical analysis, *Underwater radio transmission.) (Dipole moments, Electromagnetic fields, Electric fields.)

A study is presented of the electromagnetic fields caused by electric dipoles located within

a highly conductive medium such as the sea. The basic method used is described as the plane wave approach. The purpose of the plane wave approach is to use the basic notions of plane waves to determine useful information about the sea-air problem without resorting to asymptotic expansions. The theory of nonuniform electromagnetic plane waves is presented. Two plane wave boundary value problems pertaining to the sea-air problem are studied. The transmission coefficients are used to construct the field transmitted into the air by a submerged electric dipole. Some fundamental properties of fine submerged antenna structures are developed. The theory of nonuniform plane waves is extended to the n-layer problem.

AD-263 284 Div. 8
(TIPSE/DLW) OTS price $9.10

National Co., Inc., Malden, Mass.
MILITARIZED ATOMICHRON.
Final rept. 1 June 58-31 Dec 60.
Feb 61, 104p. incl. illus. tables.
(Contracts DA-36-039-sc-74863 and DA-36-039-sc-84935)
Unclassified report

DESCRIPTORS: (Frequency, Standards, Resonance, Stability, Atoms, Vibration, Cesium, Gases, Quartz crystals, *Frequency multipliers, *Crystal oscillators, Oscillator circuits, Amplifiers, Servo amplifiers, Power supplies, Design, Reliability, Tests.) (Navigation, Guidance, Communication systems, Military requirements.)

The principles of system operation are included, along with the theoretical aspects involved in the implementation of the design for optimum performance. The discussion approach follows the research and development efforts, problems, and solutions pertaining to two major tasks: (1) converting or adapting the subassemblies that were previously developed, and (2) the design of new subassemblies. These major tasks are discussed in their relationship to: (a) the main system components, (b) the adapter unit components and (c) the beam tube section of the system. Further development possibilities worth future investigation are also mentioned. The end result of this research and development program is a highly accurate and stable primary frequency standard. (Author)

AD-263 339 Div. 8, 25
(TIPSE/DLW) OTS price $1.60

Institute of Science and Tech., U. of Michigan, Ann Arbor.
ON THE PROBLEM OF PULSED OSCILLATIONS IN RUBY MASER.
by George Makhov. Sep 61, 10p. 9 refs. (Rept. no. 2900-283-R)
(Contract DA 36-039-sc-78801, Proj. Michigan)
Unclassified report

DESCRIPTORS: (*Masers, *Microwave oscillators, Paramagnetic resonance, Oscillation, Resonance, Mathematical analysis.) (Ruby, *Paramagnetic crystals, Aluminum, Chromium, Electron Transitions, Nuclear spins.) Oscillators.

It was found that the mechanism responsible for pulsed oscillations in ruby maser is contained in the paramagnetic material, and bears a connection with ENDOR (electron-nuclear double resonance) interactions existing in ruby. This discovery refutes the theory, commonly held, that the pulsed mode is the result of elementary interaction between the inverted population of the electron-spin system of the paramagnetic substance and the resonant cavity. The pulsed mode of oscillation is accounted for by suggesting that, in the case of the interaction between the electron-spin system and the resonant cavity, the instability producing pulsed oscillations is contained in the spin system. This instability results from the interaction between chromium electrons and distant Al27 nuclei, and effects the pumping rather than the signal transition. (Author)

AD-263 391 Div. 8, 14
(TIPSE/CRJ) OTS price $3.60

Sperry Gyroscope Co., Great Neck, N. Y.
HIGH AVERAGE-POWER R-F WINDOW STUDY.
Quarterly memo. no. 2, 26 Apr-26 July 61,
by D. B. Churchill and E. W. Cheatham. Aug 61, 25p. incl. illus. (Sperry rept. no. NA-8220-8261-2)
(Contract AF 30(602)2428, Proj. 5573)
Unclassified report

DESCRIPTORS: (*Waveguide windows, Dielectrics, Ceramic materials, Single crystals, Synthetic gems, Sapphires, Aluminum compounds, Beryllium compounds, Wave transmission, Electron bombardment, Seals, Design, Tests.) Microwave equipment, Broadband, Electron tubes, Waveguides. (Cavity resonators, Waveguide couplers, Design.)

The literature study and survey of the commercially available dielectric materials for window applications was completed. It was found that single-crystal synthetic sapphire, cut with the axis of the disc parallel to the C-axis of the crystal, is the best available material from the standpoints of mechanical strength and dielectric loss factor. High-energy electronic bombardment tests on sample windows of sintered alumina and crystalline synthetic sapphire were completed. The final oven brazes of the hybrid coupler assembly, a component of the high-power resonator, were completed. Also, the high-directivity monitor coupler was designed, and a prototype model was satisfactorily tested. The high-power water load was designed, and a prototype model was completed. A nearly perfect match at the specified operating frequency was exhibited by the model. An investigation was made of the problems of sealing rectangular block windows. Satisfactory transmission characteristics were achieved on 2 prototype models of broadband disc windows. The operation frequency bands overlap slightly, with the test frequency of 8.35 kmc in the region of overlap. (Author)

AD-263 393 Div. 8
(TIPSE/RD) OTS price $10.10

Microwave Lab., Stanford U., Calif.
MICROWAVE PROPERTIES OF CERAMIC NONLINEAR DIELECTRICS.
Technical note,
by D. A. Johnson. July 61, 118p. incl. illus. 27 refs. (ML rept. no. 825)
(Contract AF 49(638)415, Proj. 47501)
(AFOSR-1149) Unclassified report

DESCRIPTORS: (*Ceramic materials, *Dielectrics, Nonlinear systems, Test methods.) (*Microwaves, X band, Measurement.) (Barium compounds, Strontium compounds, Titanates.) Phase shifters, Interferometers, Cavity resonators, Mathematical analysis, Differential equations.

This investigation was undertaken to develop and apply new measurement techniques for obtaining the small-signal and large-signal microwave characteristics of ceramic nonlinear dielectrics. A transmission method for measuring the small-signal complex dielectric constant was derived and is described in detail. Measurements were made on representative ceramics in the X-band frequency range, and the results are given as curves of the real part of the relative dielectric constant and of the loss tangent as functions of temperature with dc bias levels up to 32 kv/cm. An experimental curve of the relative dielectric constant of a 73% barium titanate-27% strontium titanate ceramic was obtained for the frequency range of 3 kmc to 270 kmc. A curve showing the per cent change of the relative dielectric constant over the temperature range from 95 F to 123 F (the Curie temperature is approximately 72 F) was also obtained. The large-signal microwave characteristics of a nonlinear dielectric were measured at 3 kmc by using a re-entrant coaxial cavity in which a cylindrical post of the ceramic was placed in the region of high electric field intensity. (Author)

AD-263 394 Div. 8, 25
(TIPSE/DLW) OTS price $4.60

Syracuse U. Coll. of Engineering, N. Y.
MICROWAVE APPLICATION OF FERRITES. PART II. EQUIVALENT CIRCUIT OF THE FERRIMAGNETIC AMPLIFIER. EXPERIMENTAL PROGRAM. GROWTH OF YTTRIUM IRON GARNETS.
Final technical rept., pt. 2,
by Harry Gruenberg and Volker Weiss. 16 Aug 61, 40p. incl. illus. table (Rept. no. EE 850-6109F2)
(Contract AF 30(602)1627)
(RADC TR 61-165 B) Unclassified report

DESCRIPTORS: (*Ferromagnetic materials, Ferrites, *Microwave equipment, *Microwave amplifiers, Electromagnetic properties, Magnetic properties, Dielectric properties, Mathematical analysis, Partial differential equations, Perturbation theory.) (*Parametric amplifiers, Cavity resonators, Dielectrics, Crystals, Diodes, Design, Tests, Electronic circuits.) (Single crystals, Yttrium, Iron, Garnet, Growth.) Amplifiers.

The equivalent circuit of a ferrimagnetic amplifier was derived from first principles. The result is obtained by a perturbational procedure and applies directly to electromagnetic operation of the amplifier only. It can, however, also be used for the modified semi-static operation. The experimental program was directed toward reduction of pump power requirements in the operation of parametric amplifiers using single yttrium iron garnet (YIG) crystals as the active element. This aim was achieved only partially. Pump power levels were reduced to about 2 watts with some amplifier configurations. This is somewhat short of the goal to reduce threshold levels to powers below 1 watt which might bring this type of amplifier within a practical range. Growing methods and results are presented for single crystal yttrium-iron garnet crystals. (Author)

AD-263 395 Div. 8, 25
(TIPSE/DLW) OTS price $7.60

Syracuse U. Coll. of Engineering, N. Y.
MICROWAVE APPLICATIONS OF FERRITES. PART I. THE MICROWAVE SUSCEPTIBILITY OF A SATURATED FERROMAGNETIC MEDIUM.
Final technical rept. pt. 1,
by Joseph V. Cornacchio and Harry Gruenberg.
16 Aug 61, 74p. incl. illus. 15 refs. (Rept. no. EE 850-6109F1)
(Contract AF 30(602)1627)
(RADC TR 61-165 A) Unclassified report

DESCRIPTORS: (*Ferromagnetic materials, Ferrites, *Microwave equipment, *Microwave amplifiers, Tensor analysis, *Magnetic susceptibility, Mathemical analysis, *Electromagnetic properties.) (*Electromagnetic fields, Electric fields, Magnetic fields, Cavity resonators, Partial differential equations, Matrix algebra, Ferromagnetic materials, Frequency, Theory.) Amplifiers.

Research was concerned with the relationship between the magnetization and a microwave field in a saturated ferromagnetic medium when the field contains one or more frequency components. This relationship is of a tensor nature, and due to cross product terms in the equation of motion of the magnetization there is a coupling between the magnetization at one frequency and the field at another frequency. Suhl suggested that this form of cross coupling could be used to produce amplification if the proper field orientation and frequency relationship existed. The susceptibility tensor is derived for the case when two of the applied fields are of the same frequency (the degenerate case), and for the modified semi-static mode configuration. A comparison of the susceptibility expressions is made with results given in the literature for special field and sample configurations. Results are tabulated for the susceptibility tensor for special cases of static field orientation and sample shape. (Author)

AD-263 415 Div. 8, 20
(TIPSE/RD) OTS price $22.25

Bendix Systems Div., Bendix Corp., Ann Arbor, Mich.
M&TC SYSTEM STUDY.
Final engineering rept., vol. 1.
Dec 60, 429p. incl. illus. tables (Rept. no. BSR-371, pt. 1, sections 1 to 6)
(Contract AF 33(600)35026)
Unclassified report

DESCRIPTORS: (*Electronic equipment, Transmitter receivers, Radio receivers, Radar equipment, Radar beacons, Radio beacons, Radio equipment, Airborne, *Radiation effects.) (Radio communication systems, Radio navigation, Identification systems.) (Nuclear power plants, Nuclear propulsion, Radiation effects, Radioactivity.)

Contents:
Marker Beacon Receiver AN/ARN-32
UHF transceiver AN/ARC-34
Radio receiving set AN/ARN-31
Tacan transceiver AN/ARN-21
Air-to-ground identification set AN/APX-19(XA-4)

AD-263 418 Div. 8, 20
(TIPSE/RD) OTS price $23.50

Bendix Systems Div., Bendix Corp., Ann Arbor, Mich.
M&TC SYSTEM STUDY.
Final engineering rept., vol. 1,
Dec 60, 460p. incl. illus. tables (Rept. no. BSR-371, pt. 2, sections 7 to 13, appendices A and B)
(Contract AF 33(600)35026)
Unclassified report

DESCRIPTORS: (*Electronic equipment, Transmitter receivers, Capacitors, Potentiometers, Rotary switches, Electric connectors, Semiconductors, Diodes, Pentodes, Relays, Transformers, Wire, *Radiation effects, Airborne.) (Radio communication systems, Radio navigation, Identification systems.) (Research reactors, Radioactivity.) (Aircraft, Nuclear power plants, Nuclear propulsion.) (Epoxy resins, Tantalum, Insulating materials.)

Contents:
Radio beacon AN/ART-27 (XA-5)
Air to air identification system, interrogation set AN/APX-26 and transponder set AN/APX-27
Nuclear environment
Component evaluation and proof tests
Operating conditions
Design techniques for reliability assurance
Some current design considerations

AD-263 421 Div. 8, 5
(TIPSE/DSW) OTS price $2.60

Electronic Defense Labs., Mountain View, Calif.
A COMPACT TUNABLE TUNNEL DIODE S-BAND RECEIVER,
by John Reindel. 1 Aug 61, 18p. incl. illus.
(Technical memo. no. EDL-M394)
(Contract DA 36-039-sc-87475)
Unclassified report

DESCRIPTORS: (*Radio receivers, *Miniature electronic equipment, S band, Ultra high frequency, Noise (Radio), Reduction, Radio equipment, Design.) (*Diodes, *Miniature electron tubes, Electronic circuits, Transmission lines, Intermediate frequency amplifiers, Preamplifiers, Tuning circuits, Antenna horns, Design, Tests.) Amplifiers, Electron tubes.

A description is given of a tunable low-noise (7 db max.) S-band receiver consisting of antenna horn, stabilizing network, tunnel diode amplifier and tunnel diode down-converter. Design problems are discussed. Performance characteristics are given to illustrate the many advantages of tunnel diode circuits for S-band receivers. (Author)

AD-263 442 Div. 8
(TIPSE/DLW) OTS price $3.60

Ionosphere Research Lab., Pennsylvania State U., University Park.
AN INSTRUMENT TO OBSERVE THE PHASE AND AMPLITUDE FLUCTUATIONS OF VHF RADIATIONS FROM ARTIFICIAL EARTH SATELLITES,
by J. P. DeBarber. 15 Aug 61, 34p. incl. illus.
(Scientific rept. no. 151)
(Contract AF 33(616)6157)
Unclassified report

DESCRIPTORS: (*Ionospheric propagation, Ionosphere, Wave transmission, *Electromagnetic waves, Radio waves, Atmospheric refraction, Refractive index, Very high frequency, Phase detectors, Phase measurement, Measurement, Test equipment, Design, Recording devices, *Recording systems, Instrumentation, Theory.) (Satellite vehicles, Extraterrestrial radio waves, Antennas.)

A description is presented of an instrument for studying the irregular character of the ionosphere as shown by the fluctuations in phase and amplitude of received VHF radiation from artificial earth satellites. Specifically, the equipment provides simultaneous records of the relative phase of the signal received at spaced antennas and of the amplitude at a single antenna. Discussed are: (1) a theory in which the mean square value of phase fluctuation between antennas and the mean square fractional amplitude fluctuation are related to such parameters as wavelength, zenith angle, height, and the scale, ellipticity, and intensity of the responsible irregularities in ionization, (2) the details of the instrumentation, and (3) typical records taken on 54 mc radiated by Transit 4A. (Author)

AD-263 454 Div. 8
(TIPSE/DLW) OTS price $2.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
THRESHOLD COMPARISON OF PHASE-LOCK, FREQUENCY-LOCK, AND MAXIMUM-LIKELIHOOD TYPES OF FM DISCRIMINATORS,
by J. J. Spilker, Jr. July 61, 16p. incl. illus. 20 refs. (Rept. no. 2-43-61-2)
(Contract AF 30(602)2232)
Unclassified report

Presented at the IRE WESCON Conference, 1961. San Francisco, Calif.

DESCRIPTORS: *Discriminators, Frequency modulator, Signal-to-noise ratio, Modulation, Noise (Radio), Radiofrequency filters, Integral transforms, Mathematical analysis, Symposia, Functions.

In making a comparison of demodulation techniques for FM signals, one of the most important criteria for evaluation is the threshold input signal-to-noise ratio (SNR). It is at this value of input SNR that the output SNR begins to decrease, substantially more rapidly than a simple proportionality to the input SNR. A consistent derivation is presented of the threshold SNR for several major types of FM discriminators, namely, the phase-lock discriminator, the frequency-lock discriminator (FM discriminator with negative feedback), and the maximum-likelihood (a posteriori, most probable) computer. This last discriminator is of interest mainly because its operation provides a bound on the performance of other types. The operation of the discriminators in the presence of gaussian interfering noise is described, and the causes of threshold are investigated. (Author)

AD-263 460 Div. 8
(TIPSE/DLW) OTS price $1.10

Science and Tech. Section, Air Information Div., Washington, D. C.
BEAM MASER FREQUENCY CHARACTERISTICS.
2 Aug 61, 2p. (AID rept. no. 61-115; Trans. from Investigation of Molecular-generator Frequency as a Function of Various Parameters. Part II: The J 3, K 3 Line. Radiotekhnika i elektronika no. 6:1020-1028, June 61)
Unclassified report

DESCRIPTORS: (*Masers, Microwave amplifiers, Ammonia, Frequency stabilizers, Tuning devices, *Cavity resonators, *Frequency shifts, Stability, Test methods, Tests.) Amplifiers, USSR, Translations.

In order to analyze the tuning precision and frequency stability of ammonia masers, a series of experiments was conducted in which maser frequency was determined as a function of cavity tunning, sorting voltage, and gas pressure. The authors attempt to meet the rigorous requirements necessary for complete analysis of maser action by procuring more refined and detailed data than that currently available. (Author)

Division 8 - ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-263 466 Div. 8, 25, 30
(TIPSE/GRW) OTS price $6.60

Microwave Physics Lab., Palo Alto, Calif.
ELECTRICAL BREAKDOWN IN THE ATMOSPHERE.
Final rept.,
by A. D. MacDonald, H. W. Bandel and others.
12 May 61, 64p. incl. illus. tables.
(Contract AF 30(602)2261, Proj. 5561)
(RADC TR 61-135) Unclassified report

DESCRIPTORS: (Atmosphere, *Electric fields, Electron beams, Air.) (*Cavity resonators, Reliability, Upper atmosphere, *Low pressure research, Tests, Test methods, Instrumentation.) Microwave amplifiers, Nitrogen, Oxygen, Diffusion, Electron beams.

Measurements of the electrical fields required to initiate breakdown in five resonant cavities, at a frequency of 9.4 kmc, in air and in nitrogen and in oxygen are described. The cavities are of varying sizes and have characteristic diffusion lengths varying from 0.104 to 1.32 cm. The pressures vary from about 0.08 to 120 mm of mercury, corresponding to 12 to 65 km altitude. Results indicate that extrapolation from existing data at one frequency to predictions at other frequencies is not straightforward when the characteristic diffusion length is large. Detailed analysis of an experiment to measure attachment in oxygen and collision cross-sections in oxygen, nitrogen, and air by means of a beam experiment are presented. Feasibility of the crucial components required to make measurements of beam regions down to .05 ev was shown, and construction of the apparatus for the experiment is under way. (Author)

AD-263 530 Div. 8, 25
(TIPSP/WH) OTS price $9.60

Geophysics Corp. of America, Boston, Mass.
STUDY OF THE INTERACTION OF ELECTROMAGNETIC RADIATION AND HYDROMAGNETIC WAVES AND SHOCKS IN AN IONIZED MEDIUM.
Final techical rept.,
by Donald H. Menzel, Carl A. Accardo and others.
14 Sep 61, 116p. incl. illus. (GCA Technical rept. no. 61-39-A)
(Contract AF 19(604)7353)
(AFCRL-766) Unclassified report

DESCRIPTORS: (*Electromagnetic waves, *Magnetohydrodynamics, Shock waves, Ionization.) Theory. (Mathematical analysis, Differential equations.) *Ionosphere, *Modulation.

A review of the classical Bailey-Martyn theory of cross modulation (Luxembourg effect) is given. A theory is developed for electromagnetic waves in a plasma leading to a dispersion relation that depends explicitly on the velocity-distribution function f(q,t) of the electrons. The complex index of refraction is determined by the isotropic part, of, f, and a formula for the time independent part of f is derived. The time dependent part of the function is reduced to a problem of determining the solution of a pair of simultaneous second order differential equations. Next follows a detailed discussion of the coupled pair of (quasi hypergeometric) differential equations. The magnetohydrodynamic interaction of a partially ionized gas with electromagnetic waves is considered and the resulting dispersion relation illustrates the coupling between mechanical and electromagnetic waves. (Author)

AD-263 537 Div. 8
(TIPSE/RD) OTS price $6.60

Institute of Science and Tech., U. of Michigan, Ann Arbor.
A METHOD FOR OBTAINING EXTREMELY ACCURATE CATHODE-RAY-TUBE SWEEPS,
by John D. Campbell. Sep 61, 55p. incl. illus.
(Rept. no. 2900-296-T)
(Contract DA 36-039-sc-78801, Proj. Michigan)
Unclassified report

DESCRIPTORS: (*Cathode ray tubes, Oscilloscopes.) (Feedback amplifiers, *Sweep generators.) (Errors, Reduction.) (Linear systems.)

A method is described of obtaining very accurate, linear, CRT (cathode-ray-tube) sweeps. Sweep accuracies approximately 100 times better than those obtainable by conventional techniques are possible. The technique is best applied to unmodulated CRT sweeps; however, it may also be applied to amplitude-modulated sweeps and, under special conditions, to intensity-modulated sweeps. A feedback control loop is used. A linear second-order model system is developed and analyzed, in generalized terms, for three simple input-error functions: a step, a ramp, and a sinusoid. From these results an ideal-design approach is developed, and the limitations of this approach are indicated. Other design approaches are discussed briefly. Some special design considerations are discussed and other possible applications of the technique are mentioned. A sample calculation of the major parameters of a specific system is included as well as some experimental data and results obtained from a crude breadboard model. The experimental results confirm the feasibility of the technique. It may find application in video mappers, radar display systems, and other display, recording, or scanning systems requiring extremely accurate CRT sweeps. (Author)

AD-263 539 Div. 8
(TIPSE/DLW) OTS price $3.60

Lansdale Div., Philco Corp., Pa.
RESEARCH AND DEVELOPMENT OF A 1000 MC GERMANIUM AMPLIFIER TRANSISTOR.
Final rept. 1 July 60-30 June 61,
by R. L. Luce and James Biscoe. 30 June 61,
29p. incl. tables (Rept. no. R 111.1)
(Contract DA 36-039-sc-85367)
Unclassified report

DESCRIPTORS: (*Transistor amplifiers, Transistors, Diodes, Ultra high frequency, Germanium, *Manufacturing methods, Electronic circuits, Processing, Life expectancy, Tests, Design.) Specifications, Amplifiers.

The 1000 mc neutralized power gain of 100 units produced ranged between 6 and 11 db. These same units had unneutralized power gains that ranged from 7 to 14.5 db. The results of the environmental and life tests show that the units are stable and well within the required established range. One of the units fabricated had 16.2 db of power gain at 1000 mc. (Author)

AD-263 558 Div. 8, 25
(TIPSE/DLW) OTS price $7.60

Boulder U., Colo.
MILLIMETER WAVE TRANSITIONS FOR FREQUENCY

CONTROL.
Final rept.,
by Frank Barnes, Donald Burkhard, and Masataka Mizushima. 10 June 61, 72p. incl. illus. tables. (Contract DA 36-039-sc-85313, Proj. 3A-99-15-001-03)
Unclassified report

DESCRIPTORS: (*Molecular beams, *Microwave frequency, Standards, Sodium compounds, Hydrides, Detectors, Design.) (Molecules, Molecular rotation, Deflection, Physical properties, Electric fields, Magnetic fields, Nuclear spins, Noise (Radio), Theory, Matrix algebra, Mathematical analysis.) Test equipment.

Progress is reported on the development of a molecular beam frequency standard. These results included the Hamiltonian and Matrix elements for the hyperfine structure of NaH in the presence of a combined electric and magnetic field, and a discussion of the noise properties of a molecular beam. Additionally, a brief note on the beam tester, magnetic shields, and the high field Stark effect is included. (Author)

AD-263 569 Div. 8
(TIPSE/DSW) OTS price $9.10

Electronic Systems Lab., Mass. Inst. of Tech., Cambridge.
INVESTIGATION OF A TUNNEL-DIODE FLIP-FLOP,
by John S. MacDonald. July 61, 101p. incl. illus. tables (Rept. no. ESL-TM-114)
(Contract AF 33(616)7700)
Unclassified report

DESCRIPTORS: (*Diodes, *Trigger circuits, Electronic circuits, Analysis, Mathematical analysis, Theory.) Thesis, Electron tubes.

A nonsynchronous tunnel-diode flip-flop is described and analyzed. All of the detailed analysis deals with the case of an unloaded circuit. Methods are developed which describe the dynamic behavior of the circuit and provide for the determination of rise time and maximum repetition frequency. Stability of the circuit in its steady state is considered and restrictions governing it are clearly set out. Experimental verification of the theoretical predictions is provided, and in general appears to bear out the theory very well. A particular circuit used as a vehicle for the methods of analysis was found to have a rise time of the order of 10 nanoseconds, and was theoretically able to trigger on a pulse of 1.28 ma amplitude, and 2.1 nanoseconds duration. (Author)

AD-263 610 Div. 8
(TIPSE/DLW) OTS price $2.60

Microwave Lab., Stanford U., Calif.
SOLID-STATE, TWO-LEVEL, HIGH-POWER MASER.
Quarterly progress rept. no. 6, 1 Mar-31 May 61 on Study of the Feasibility of a Solid-State, Two-Level, High-Power Microwave Generator,
June 61, 23p. incl. illus. (ML rept. no. 824)
(Contract DA 36-039-sc-85263, Proj. 3-99-00-000)
Unclassified report

DESCRIPTORS: (*Masers, Microwave amplifiers, *Radiofrequency generators, K band, Pulse generators, Microwaves, Solid state physics, Low pass filters, Design, Feasibility studies.) (Amplifiers, Ferrites, *Ferromagnetic materials, Magnetic fields, Dielectrics, Single crystals, Garnet, Electrical properties, Spin, Measurement.)

Further experiments on pulsed microwave generation without an rf input signal gave negative results. Equations of motion for the magnetization in a ferrite disk in a transient magnetic field were set up on an analog computer. Work on a low pass input filter for a K-band generator, using a non-linear dielectric element, was continued. Measurements were made on a series of linear dielectric materials and initial measurements were made of the properties of polycrystalline and single crystal garnet disk samples. Methods for suppressing spin wave instability and thus increasing the power input of the existing ferrite generators were investigated. Alternate approaches to pulsed ferrite generation utilizing the crystalline anisotropy field were studied. (Author)

AD-263 611 Div. 8, 26
(TIPSE/DLW) OTS price $13.00

Motorola, Inc., Phoenix, Ariz.
INDUSTRIAL PREPAREDNESS MEASURE ON 1 WATT 70 mc GERMANIUM MESA TRANSISTOR.
Final engineering rept. (Step 1), 21 July 59-30 Aug 61,
by N. L. Lincoln. 30 Aug 61, 183p. incl. illus.
(Contract DA 36-039-sc-81296)
Unclassified report

DESCRIPTORS: (*Transistor amplifiers, Power amplifiers, Very high frequency, Production, Processing, Packaging, *Manufacturing methods, Design.) (*Transistors, Germanium, Mechanical properties, Electrical properties, Measurement.) Specifications, Amplifiers.

Investigations were completed on the 1 watt, 70 mc, pilot production run. A pilot production line was developed which exhibits mature, controlled manufacturing techniques. The high frequency and power requirements of the proposed device required the development of a completely new approach to the package and design of a mesa device. General mechanical and electrical descriptions are presented and the process technology is described in narrative form. The necessary equipment and the pilot production run are also described. (Author)

AD-263 619 Div. 8, 26
(TIPSE/DLW) OTS price $3.60

Pacific Semiconductors, Inc., Lawndale, Calif.
PRODUCTION ENGINEERING MEASURE FOR VARIABLE CAPACITOR DIODES.
Quarterly rept. no. 4, 1 Apr-30 June 61,
by R. N. Clarke. 30 June 61, 30p. incl. illus. tables (PSI rept. no. 4000:8-4-Q)
(Contract DA 36-039-sc-85942)
Unclassified report

DESCRIPTORS: *Variable capacitors, Diodes, *Modulators, Frequency modulation, Frequency stabilizers, *Tuning devices, *Manufacturing methods, Production, Processing, Design, Tests, Electrical properties, Specifications.

Work was devoted to the pre-production testing of the SCS-61A and the SCS-61B, and to the establishment of the input parameters for the SCS-62 to meet the revised specification. The new diffusion technique met with certain technical difficulties and was temporarily discontinued in favor of the former technique. The initial

problems associated with the new junction formation equipment were resolved. In an effort to obtain a better optimization between the figure of merit and capacitance ratio, a much closer look was taken at the factors affecting the series resistance. The pre-production testing of the SCS-61A and the SCS-61B was accomplished, including a reinspection on dynamic testing. The electrical characteristics of the two groups of pre-production testing samples are profiled for analysis. (Author)

AD-263 624 Div. 8
(TIPSE/NTM) OTS price $1.60

Stelma, Inc., Stamford, Conn.
DEVELOPMENT OF TELEGRAPH TERMINAL TH-22( )/TG.
Quarterly progress rept. no. 1, 1 Mar-1 June 61, by R. Couturier and R. Mottino. 1 June 61, 15p. incl. illus.
(Contract DA 36-039-sc-87188)
Unclassified report

DESCRIPTORS: (Design, Miniature electrical equipment, *Telegraph signals, *Telegraph systems, *Telegraph equipment, *Transistors, Specifications.) (Teletype systems, Frequency shift, Voice communication systems, Direct current, Telegraph systems, Relay transmitters, Tests.)

Research is on the development of a lightweight transistorized terminal capable of converting teletypewriter output into frequency-shift voice-frequency signals (and vice versa), and of breaking in on a telegraph transmission. The report covers the study phase of the project during which time: (1) covering specification SCL-1566A was analyzed; (2) power supply and circuitry, based on that of the TH-22 (XC-1)/TG, was breadboarded and tested; and (3) possible approaches to the break-in feature were formulated. One approach uses a resonant-reed relay to detect the break-in signal; the other, a low-pass filter to separate the break-in signal from local keying frequencies. Because this is the first report on the project, no firm conclusions are reached. (Author)

AD-263 625 Div. 8
(TIPSE/DLW) OTS price $6.60

Syracuse U., Coll. of Engineering, N. Y.
A STUDY OF SEMICONDUCTOR RELIABILITY,
by B. A. Bowen. June 61, 66p. incl. illus. tables, 24 refs. (Rept. no. EE751-6106TN2)
(Contract AF 30(602)2177)
(RADC TN 61-131) Unclassified report

DESCRIPTORS: (*Semiconductors, Failure (Mechanics), Reliability, Determination, Mathematical prediction, Statistical analysis.) (*Transistors, Germanium, Surface properties, Electrical properties, Test methods, Tests, Manufacturing methods, Life expectancy.)

A study was undertaken to determine the mechanics of failure of semiconductor devices. A review is given of the physical and statistical basis for failures and failure testing. A review is also presented of the present status of transistor reliability. (Author)

AD-263 639 Div. 8
(TIPSE/DLW) OTS price $2.60

David Taylor Model Basin, Washington, D. C.
A SIGNAL NORMALIZING AMPLIFIER,
by David J. Plumpe. July 61, 20p. incl. illus. table (Rept. no. 1541)
Unclassified report

DESCRIPTORS: (*Audio amplifiers, *Automatic volume control, *Magnetic recording systems, Magnetic tape, Switching circuits, Electronic circuits, Design.) (*Hydrophones, Auditory signals, Underwater sound signals, Recording devices, Amplifiers, Laboratory equipment, Effectiveness, Tests.) Specifications.

A signal normalizing amplifier was developed for use in compressing the level of signals having a wide dynamic range to a level suitable for recording on magnetic tape or other media having limited dynamic range. Signal compression is effected by automatic action of the amplifier, which changes its gain in discrete 10-db steps. Signal distortion is limited to a very small transient of short duration, which occurs only during the transitional period. The gain of this amplifier varies from zero to 40 db although other ranges may be easily incorporated. In addition to the signal output, the amplifier provides an indication of amplifier gain which may be used in reconstructing or otherwise recovering information concerning the full dynamic range of the original signal. The completely solid-state design, its operation, the circuitry involved, the adjustment procedure, and the specifications of the laboratory model are described. (Author)

AD-263 642 Div. 8
(TIPSE/DLW) OTS price $3.60

Westinghouse Electric Corp., Baltimore, Md.
RESEARCH ON MILLIMETER FERROMAGNETIC TYPE PARAMETRIC AMPLIFIER.
Quarterly progress rept. no. 2, 1 May-30 July 61, by Robert A. Moore and Milton L. Laflen.
30 July 61, 38p. incl. illus.
(Contract DA 36-039-sc-87401)
Unclassified report

DESCRIPTORS: (*Parametric amplifiers, Microwave amplifiers, Microwave equipment, Traveling wave tubes, Ferrites, Design, Feasibility studies.) (*Ferromagnetic materials, Antiferromagnetism, Magnetic fields, Magnetic properties, Dielectric properties, Materials, Mathematical analysis, Measurement.) Electron tubes, Amplifiers.

The parameters of the modified semistatic mode of amplification were optimized with respect to the pump power required for amplification. The pump power required by the parametric medium is insignificant compared with the power absorbed by the cavity for the frequency range considered. The power required by the medium decreases with frequency. The modified semistatic mode of operation was formulated for the structure which utilizes the ferrimagnetic rod electromagnetic mode resonances to concentrate the pump and signal magnetic fields. The properties of a longitudinally pumped amplifier which utilizes an antiferromagnetic parametric medium was formulated. The broad resonant line width of presently available antiferromagnetic materials suitable for microwave applications limits their use for parametric amplification. Spherical resonators of single crystalline yttrium-iron-garnet were ground and polished to a line width of 2 oersteds at a frequency of 15 kmc. The resonant line width can be measured on the Magic-Tee impedance bridge from 4 to 35 kmc. Cavities for measuring the general properties were constructed for 17, 25, and 35 kmc. (Author)

AD-263 643 Div. 8, 7, 14
(TIPSP/WLH) OTS price $1.10

Westinghouse Electric Corp., Baltimore, Md.
ELECTROLUMINESCENT FERROELECTRIC (ELF) SOLID

STATE DISPLAY.
Quarterly interim development rept. no. 13;
1 June-31 Aug 61.
31 Aug 61, 8p. incl. table.
(Contract NObsr-72782)
Unclassified report

DESCRIPTORS: (*Display systems, Solid state physics, Luminescence, *Luminescent materials.) (Films, *Electronic switches, Cadmium compounds, Sulfides.) (Ionic current, Electronic switches, Silicones.) Ferroelectric materials.

Contents:
Materials research
Electroluminescence
Ferroelectrics
Cadmium sulfide element switches
Laminar screen development
Model fabrication
Materials processing
Signal distribution
Ionic switch deterioration in the experimental model
Ionic switch operating life

AD-263 644 Div. 8, 26
(TIPSE/DLW) OTS price $5.60

Western Electric Co., Laureldale, Pa.
PRODUCTION ENGINEERING MEASURE. MECHANIZATION OF SEMICONDUCTOR DEVICES 2N560, 2N1051, 2N1195, 1N664, 1N665, 1N666, 1N667, 1N668, 1N669, 1N673, 1N697 AND 1N701.
Quarterly progress rept. no. 8, 26 Mar-26 June 61, on Design and Provide High-Volume Production Equipment for Use in the Manufacture of Semiconductor Devices,
by B. W. Shugars. 26 June 61, 50p. incl. illus. tables.
(Contract DA 36-039-sc-81294)
Unclassified report

DESCRIPTORS: (Semiconductors, *Transistors, *Diodes, Processing, Production, Machines, *Manufacturing methods, Design, Tests, Packaging.) Test equipment.

Development work was continued on the mechanization of the 2N560, 2N1051 and 2N1195 transistors as well as the family of 1/4 watt diodes. (Author)

AD-263 657 Div. 8
(TIPSE/DLW) OTS price $4.60

Diamond Ordnance Fuze Labs., Washington, D. C.
DETECTION OF DOPPLER AND OTHER SIGNALS IN A HOMODYNE PULSE SYSTEM,
by Louis M. Tozzi. 7 Aug 61, 50p. incl. illus.
(DOFL rept. no. TR-939)
(DOFL proj. 20100)
Unclassified report

DESCRIPTORS: (*Radio altimeters, Radio signals, Doppler systems, *Pulse ratio indicators, Phase measurement, Range finding.) (Radio signals, Crystal mixers, Low pass filters, Detection, Frequency modulation, Pulse modulation, Synchronizers, Mathematical analysis.)

A homodyne pulsed radio altimeter is analyzed. First the instantaneous phase difference between the transmitted and received waves, for both the phase coherent and noncoherent cases, is discussed. The possibility of reconstructing a doppler, and/or a frequency modulation induced beat frequency from a series of pulses is then considered, and finally attention is given to the mixer where the effect of low pass filtering on its output is analyzed. An expression defining the percentage of the total received signal that may be converted to a useful output from a given number of available pulses is derived. This expression is a function of the circuit parameters and the time delay between transmission and reception. Graphs of the filtered mixer output and the percentage of the signal recovered as a function of time delay are presented. (Author)

AD-263 658 Div. 8
(TIPSE/DLW) OTS price $1.60

Diamond Ordnance Fuze Labs., Washington, D. C.
LATERAL CURRENT CONTROL OF COLD-CATHODE GAS DISCHARGES WITH INTERNAL AND EXTERNAL ELECTRODES,
by Ralph D. Reymond. 4 Aug 61, 18p. incl. illus.
(DOFL rept. no. TR-966)
(DOFL proj. 96396)
Unclassified report

DESCRIPTORS: (*Cold cathode tubes, *Discharge tubes, Gas discharges, Control systems, Cathodes (Electron tubes), Anodes (Electron tubes,) Electrodes, Direct current, Stability, Sensitivity, Measurement.) (Electron tubes, Electric fuzes.)

Experiments were made to explore the phenomenon of controlling a gas discharge in the Townsend region drawing small lateral currents from the discharge. The lateral currents were maintained at a given % of the anode-cathode current. These control currents were drawn from the discharge using either internal or external electrodes to which a d-c or linearly varying potential was applied, respectively. Data on the sensitivity of the discharge as a function of magnitude and direction of lateral current as well as location of control electrode were also obtained. (Author)

AD-263 659 Div. 8, 5, 25
(TIPSP/MA) OTS price $1.10

Diamond Ordnance Fuze Labs., Washington, D. C.
A SIMPLIFIED METHOD FOR MEASURING INTRINSIC RESONANCE PROPERTIES,
by George R. Jones. 24 Aug 61, 14p. incl. illus.
(DOFL rept. no. TR-970)
(DOFL proj. 20100)
Unclassified report

DESCRIPTORS: (Communications theory, *Resonance, *Resonance absorption, *Wave transmission, Waveguides, Magnetic properties, Ferromagnetic materials.) *Perturbation theory, Matrix algebra.

The relationship between intrinsic resonance characteristics and behavior of resonant systems coupled to transmission lines is analyzed in terms of a scattering matrix formalism. Use of the scattering matrix requires a systematic linearity in coupling between the transmission line and resonant sample. In addition, for simplification, these conditions are applied: (1) the resonant modes of the sample correspond to an orthogonal set of waves propagating into and out of the sample; (2) only one resonant mode is significant in a given observation. The results are developed in terms of the three-port scattering matrix, based on these simplifications in addition to parameters of the resonance. When the coupling is adjusted so as to be reciprocal and the coupling system is lossless, it is possible to make measurements of the sample behavior without computation or knowledge of the coupling parameters. Detailed procedures for making these measurements are given. (Author)

Division 8 - ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-263 701 Div. 8, 30
(TIPSE/DLW) OTS price $1.60

Litton Industries, San Carlos, Calif.
SYMPIX CATHODE RAY TUBE DEVELOPMENT PROGRAM.
Interim Development rept. no. 4 (Final) 27 Nov 60-29 July 61,
by J. Wurtz. 31 Aug 61, 9p. illus.
(Contract NObsr-81181)
Unclassified report

DESCRIPTORS: (*Cathode ray tubes, Cathode ray tube screens, Electron guns, Electrostatics, Printing.) (*Data processing systems, Computers, Electron optics, Display systems, Design, Tests.) Electron tubes.

Sympix is the name given to a high speed, direct electrostatic printing CRT with a binary selection for up to 64 symbols or characters. The Sympix CRT will print, with a six-channel two condition input, lines of alpha-numeric material 5 in. wide at extremely high speed. The program included the engineering and development required for the fabrication of wide, character height, mosaic targets, and the adaptation and modification of the Sympix gun into a working model tube. Two tubes were completed according to specifications and within fundage. (Author)

AD-263 724 Div. 8
(TIPSE/DLW) OTS price $4.60

Bomac Labs., Inc., Beverly, Mass.
BL-223A C-BAND MAGNETRON. PRODUCTION ENGINEERING MEASURES PROGRAM.
Interim rept. 19 Apr 60-19 June 61.
19 June 61, 41p. incl. illus. tables.
(Contract DA 36-039-sc-85946)
Unclassified report

DESCRIPTORS: (*Magnetrons, Cathodes (Electron tubes), C band, Materials, Ceramic materials, Processing, Production, Design, *Manufacturing methods.) (Electron tubes, Life expectancy, Reliability, Tests.)

The over-all tube length and weight of the BL-223 was decreased. Attempts were made to eliminate the expensive copper-clad molybdenum material used in the anode vanes, but the tests results proved negative. An investigation was made into a coaxial output line using ceramics in place of glass. The tuner drive assembly was improved by eliminating the tuner locking screws. The envelope material was changed from monel to kovar. The external end of the cathode assembly was shorted and the glass was replaced with ceramic. A new potting technique was accomplished, reducing costs of labor and materials. The tube shield was shortened, simplified and reduced in cost. A summary of the tubes assembled, problems encountered, and representative life tests are presented. (Author)

AD-263 786 Div. 8, 15
(TIPSP/TL) OTS price $1.10

Columbia U. School of Engineering, New York.
NONLINEAR FILTERS AND PREDICTORS.
Final rept.,
by Ralph J. Schwarz. 31 May 61, 6p. (Rept. no. CU-16-61-Nonr-26660-EE)
(Contract Nonr-26660, Proj. NR 049-134)
Unclassified report

DESCRIPTORS: (*Communication theory, Information theory, *Electric filters, Coding, *Computers, Statistical analysis, Statistical functions, Signal to noise ratio, Differential equations.) (*Detectors, Circuits, Diodes, Sampling.) Errors.

AD-263 812 Div. 8
(TIPSE/MS) OTS price $4.60

General Electric Co., Owensboro, Ky.
A STUDY OF FILMS IN ELECTRON TUBES.
Interim quarterly technical rept. no. 5, 1 May-1 Aug 61,
by J. W. Hall, II. 1 Aug 61, 37p. incl. illus. tables.
(Contract NObsr-81225)
Unclassified report

DESCRIPTORS: (*Electron tubes, *Thin films, *Films, Surfaces, Analysis.) (*Electron diffraction analysis, Neutron activation, Spectrographic analysis, Optical analysis, X-ray spectroscopy, Mass spectroscopy, Sublimation, Gases, Tests.)

Results are presented of the analysis of thin films by neutron activation techniques along with a special procedure developed to determine short lived elements. Some data from analyses by reflection electron diffraction are also presented. Additional calibration work has been conducted on the twin crystal oscillator thin film monitor to determine the mode of change of resonant frequency of the crystal as a function of film surface density. A new sublimation unit is described which should permit the simultaneous study of certain film properties, such as resistance versus mass. The work accomplished, the design, processing schedule, and parts analysis flow chart of the Random Balance Experiment are given. (Author)

AD-263 815 Div. 8, 25
(TIPSE/DLW) OTS price $4.60

General Electric Co., Syracuse, N. Y.
APPLICATIONS OF TUNNELING TO ACTIVE DIODES,
by R. N. Hall, J. H. Racette, and others.
7 July 61, 43p. incl. illus. (Scientific rept. no. 5a)
(Contract AF 19(604)6623)
(AFCRL-743 (a)) Unclassified report

DESCRIPTORS: (*Diodes, Gallium compounds, Antimonides, Germanium, Phosphides, *Semiconductors, Intermetallic compounds, Impurities, Crystals, Lead compounds, Salts, Temperature, Electrical properties, Measurement.) (*Triodes, Aluminum, Metal films, Theory, Tests.) (Gallium compounds, Arsenides, Copper, Diffusion, Electric fields, Tests.) Electron tubes.

Measurements of the temperature and voltage dependence of tunneling in Ge and GaSb are reported which give values for the separation between the (000) and (111) conduction band edges in these semiconductors. Revised values of the longitudinal optical phonon energies in 3-5 and lead salt semiconductors are summarized. Factors which limit the current gain in metal-insulator tunnel triodes are discussed. A considerable body of theoretical and experimental evidence indicates that current gains greater than 0.01 to 0.1 should be difficult to achieve. Further data on the solubility and diffusion of Cu in p-type GaAs are reported. (Author)

AD-263 816 Div. 8, 25
(TIPSE/DLW) OTS price $2.60

General Electric Co., Syracuse, N. Y.
APPLICATION OF TUNNELING TO ACTIVE DIODES,
by N. Holonyak, Jr. and S. F. Bevacqua.
7 July 61, 30p. incl. illus. (Scientific rept. no. 5b)
(Contract AF 19(604)6623)
(AFCRL-743 (b)) Unclassified report

DESCRIPTORS: (*Diodes, Chemical impurities, Manganese, Copper, Gold, Space charges, Measurement.) (Gallium compounds, Arsenides, Phosphides, Halogens, Vapors, Synthesis, Growth, Crystal structure, Lattices, Crystals.)

Hump tunnel currents and associated trapping effects which are observed in GaAs tunnel diodes contaminated with impurities such as Mn, Cu, and Au are described. The relationship of these effects to 1/f noise is indicated. Halogen vapor transport and epitaxial growth of GaAs and GaAs space charge limited emission diode are described. The halogen vapor transport, synthesis, and epitaxial growth of GaP on GaP and GaAs is also described. (Author)

AD-263 824 Div. 8
(TIPSP/MFA) OTS price $7.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
THRESHOLD SWITCHING TECHNIQUES.
Interim engineering rept. no. 2, July-Aug 61,
by R. I. Tanaka, M. Tannenbaum, and others.
Aug 61, 78p. incl. illus. tables (Rept. no. 2-01-61-2)
(Contract AF 33(616)8035)
Unclassified report

DESCRIPTORS: (Electrical networks, *Electronic switches, *Signal-to-noise ratio.) (Functions, Equations, Linear systems, *Transformations (Mathematics), Complex variables, Algebras, Matrix algebra.) (*Switching circuits, Design, Mathematical analysis.)

The study continues to emphasize the derivation of synthesis techniques applicable to the design of switching networks which incorporate threshold devices. Significant progress on establishing feasibility and in deriving supporting mathematical proofs for some of the synthesis algorithms has been made. However, a second objective, related to the practical implementation of threshold switching networks, now supplements the original emphasis. Preliminary work on two topics is described which touch directly upon hardware implementation. These are: (1) The derivation of techniques for transforming a network of given threshold elements to another network whose elements each have a different number of inputs; and (2) A definition of the characteristics of threshold elements to determine the allowable limits on various parameters. (Author)

AD-263 825 Div. 8
(TIPSE/DLW) OTS price $4.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
THRESHOLD SWITCHING TECHNIQUES.
Interim engineering rept. no. 1, 20 Mar-20 June 61,
by R. I. Tanaka, K. W. Henderson, and others.
20 June 61, 43p. incl. illus. tables (Rept. no. 2-01-61-1)
(Contract AF 33(616)8035; In cooperation with Lockheed Aircraft Corp., Palo Alto, Calif.)
Unclassified report

DESCRIPTORS: *Switching circuits, Functions, Synthesis, Theory, Integrals, Mathematical logic, Design, Mathematical analysis, Integral equations.

The results are presented of approximately 3 months of work on a study of threshold switching techniques. A description is included of some analytic representations usable for describing the characteristics of a threshold switching element. Some aspects of a synthesis technique are described which are applicable to describing and testing linearly separable functions. Information is also included concerning a synthesis approach for designing a network consisting of a two-layered network of threshold elements where the elements have minimal weights and thresholds. (Author)

AD-263 831 Div. 8, 15
(TIPSP/TL) OTS price $6.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
AN INTRODUCTION TO NETWORK ANALYSIS. PART 3. NETWORK TRANSFORMATIONS AND EQUIVALENCES,
by H. J. Carlin and A. B. Giordano. 15 Nov 60, 57p. incl. illus. (Rept. no. PIBMRI-851-60)
(Contract AF 30(602)2213, Proj. 8505)
(RADC TR 61-44, pt. 3) Unclassified report

DESCRIPTORS: (*Matrix algebra, *Transformation (Mathematics), *Topology, Series.) (Analysis, Theory, Measurement.) (Microwave networks, *Electrical networks, *Circuits, Tuned circuits, Coupling circuits, Magnetism.) (Transformers, Electric currents, Voltage, Generators, Magnetic cores, Propagation, Lattices, Excitations, Coils, Impedance.) *Functions.

Generalized approaches are considered which lead to special topics involving network interconnections, elimination of variables, network equivalences, and network transformations. (Author)

AD-263 832 Div. 8, 15
(TIPSP/TL) OTS price $2.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
CASCADED TRANSMISSION LINE SYNTHESIS,
by H. J. Carlin. 27 Apr 61, 20p. incl. illus.
(Research rept. no. PIBMRI-889-61)
(Contract AF 30(602)2213)
(RADC TR 61-157) Unclassified report

DESCRIPTORS: (*Transmission lines, *Microwave networks, Circuits, Electrical networks.) (Design, Theory, Synthesis, Impedance.) (Low pass filters, Transformers, High frequency, Propagation.) (Functions, Polynomials, *Matrix algebra, Series, *Topology.)

The basis for designing lossless cascade transmission line circuits is reviewed. Necessary and sufficient conditions for the synthesis of cascaded line two-ports are derived using scattering functions. Applications of the synthesis method are given to low pass filters and broadband impedance transformers. The presentation is primarily tutorial in character. (Author)

AD-263 837 Div. 8
(TIPSE/CW) OTS price $8.60

Texas Instruments, Inc., Dallas.
SILICON SEMICONDUCTOR NETWORKS MANUFACTURING METHODS.
Interim technical engineering progress rept., 1 April-30 June 61,
by J. W. Lathrop, W. C. Brower, and H. G. Cragon.
Aug 61, 95p. incl. illus. tables.
(Contract AF 33(600)42210, Proj. 7-865)
(ASD IR 7-865, vol. 3) Unclassified report

DESCRIPTORS: (*Semiconductors, Silicon alloys, Chemical milling, Manufacturing methods.) (*Subminiature electronic equipment, Machining.) (*Digital computers, Design.) (Borates, Methyl radicals, Phosphorus, Chlorides, Gold, Tantalum compounds, Niobium compounds.)

Process techniques required for the fabrication of semiconductor networks are being established. Studies of silicon slice preparation, diffusion, contact formation, film dielectrics and test structures are discussed. Equipment assembly techniques for a serial, digital computer are well advanced. (Author)

AD-263 839 Div. 8
(TIPSE/CW) OTS price $3.60

Electrical Engineering Research Lab., U. of Illinois, Urbana.
INVESTIGATION OF MICROWAVE DUPLEXER SWITCHING MECHANISMS.
Quarterly progress rept. no. 8, 1 Jan-31 Mar 61, by M. Roux and K. Rose. 15 Apr 61, 24p. incl. illus. tables.
(Contract DA 36-039-sc-78313, Proj. 3-99-15-104)
Unclassified report

DESCRIPTORS: (*Microwave equipment, Electronic switches, *Radar duplexers, *Switching circuits, Tests.) (*Semiconductors, Magnetrons, Microwaves, Propagation, Thin films, Shock waves, Waveguides, Plasma physics, Gas discharges, Gas ionization.) Mathematical analysis, Measurement, Test equipment.

The study of perturbations, produced in noble gases, following a high power RF breakdown (1 microsecond long) of the gas at the end of a glass tube inserted in the waveguiding system, has been pursued under different conditions of pressure, type of gas, RF power and tube geometry. The propagation velocity of these perturbations is observed to be nearly independent on the gas pressure, the RF power level and the geometry of the tube subjected to the RF pulse, but to greatly vary with the type of gas. This velocity is found to be close to the velocity of the sound in the particular gas under consideration at room temperature. Therefore these perturbations are identified with sound waves, the velocity of which being modified by the (enhanced) gas temperature. Other perturbations, detected at identical times over long distances along the tube, are believed to belong to cylindrical sound waves oscillating between the axis and the walls of the tube. Preliminary calculations have been made which demonstrate the possibility of microwave transmission through thin sheets of indium antimonide using quarter-wavelength dielectric sheets to match the sample to the waveguide. (Author)

AD-263 840 Div. 8
(TIPSE/CW) OTS price $3.60

Electrical Engineering Research Lab., U. of Illinois, Urbana.
INVESTIGATION OF MICROWAVE DUPLEXER SWITCHING MECHANISMS.
Quarterly progress rept. no. 7, 1 Oct-31 Dec 60, by M. Roux and K. Rose. 15 Jan 61, 26p. incl. illus. table, 36 refs.
(Contract DA 36-039-sc-78313, Proj. 3-99-15-104)
Unclassified report

DESCRIPTORS: (*Microwave equipment, *Radar duplexers, *Switching circuits, Mathematical analysis, Measurement, Magnetrons, *Semiconductors, Shock waves, Microwaves, *Electronic switches, S Band.) (Plasma physics, Gas discharges, Gas ionization.) Test equipment.

The first coherent results on wave propagation in the afterglow of a plasma, built up by high power, S-band, microwave pulses, are reported. This plasma is contained in a sealed glass tube of 5.5 mm internal diameter, partly introduced through a small hole into an S-band waveguide and with its axis parallel to the microwave E-field. By photomultiplier observation of the light in the afterglow, the propagation of two waves along the plasma column was detected. Measurements are summarized which were made with the resonant cavity technique for studying deviations from Ohm's law in high resistivity semiconductors. (Author)

AD-263 842 Div. 8
(TIPSE/CW) OTS price $1.60

Electrical Engineering Research Lab., U. of Illinois, Urbana.
RESEARCH STUDIES ON PROBLEMS RELATED TO ECM ANTENNAS.
Quarterly engineering rept. no. 11, 1 Mar-1 June 61.
30 June 61, 11p. incl. illus. 50 refs.
(Contract AF 33(616)6079, Proj. 9-(13-6278))
Unclassified report

DESCRIPTORS: (*Antennas, *Dipole antennas, Antenna radiation patterns, *Helical antennas, Electromagnetic properties, *Conical antennas, *Coupled antennas, Impedance, Design, Countermeasures, Mathematical analysis, Test facilities.)

AD-263 848 Div. 8
(TIPSP/WH) OTS price $3.60

Microwave Lab., Stanford U., Calif.
SPACE-CHARGE THEORY FOR ION BEAMS,
by G. S. Kino and K. J. Harker. Feb 61, 28p. incl. illus. 22 refs. (Scientific rept. no. 28; ML rept. no. 779)
(Contracts AF 19(604)1930 and AF 30(602)1844)
(AFCRL-54; RADC TN 61-159) Unclassified report

DESCRIPTORS: (*Ion beams, Instrumentation.) (*Electron guns, Optics.) (Ion rockets, *Ion accelerators, Space charges, Electrodes.) (Mathematical analysis, Operators (Mathematics).)

Analytical methods for deriving space-charge flow solutions are reviewed. Certain exact solutions in which the ions flow in circular trajectories are discussed, and form a natural accel-decel solution suitable for ion guns to be used for ion propulsion. The advantages and the disadvantages of these exact solutions are discussed. The approach to the problem using paraxial solutions is also described. Such paraxial solutions enable the uniformity of current density at the emitting anode to be adjusted. Analytical methods of electrode design are discussed, and it is shown how electrodes can be derived for any analytical space-charge flow solution. (Author)

AD-263 850 Div. 8, 25
(TIPSP/WH) OTS price $10.10

Microwave Lab., Stanford U., Calif.
ELECTRON BUNCHING IN LONG TRANSIT ANGLE CAVITIES,
by Charles W. Turner. July 61, 115p. incl. illus.
(Scientific rept. no. 32; ML rept. no. 830)
(Contract AF 19(604)1930)
(AFCRL-572) Unclassified report

DESCRIPTORS: (*Klystrons, Electrons, Space charge, *Electron beams.) (Fourier analysis, Microwave oscillators, Design, Electronic circuits.)

The properties of a long-gap cavity are investigated, both theoretically and experimentally, with particular reference to the possible realization of a high efficiency electron buncher suitable for a klystron-type device employing this form of cavity. Conclusions concerning the long-gap cavity buncher are summarized. The most remarkable feature of electron bunching obtained from the long-gap cavity is the similarity to the conventional two-cavity klystron. The long rf cavity voltage required for maximum beam current and the independence of bunching with respect to D obscure this similarity in the ballistic theory, when the small signal space-charge treatment is attempted, the likeness is unmistakable. (Author)

AD-263 852 Div. 8
(TIPSE/JAB) OTS price $1.10

Ohio State U. Research Foundation, Columbus.
ELECTRONIC TUBE TECHNOLOGY-MICROWAVE TUBES.
Interim rept. no. 1, 1 June-31 Aug 61,
by Dean T. Davis. 14 Sep 61, 7p. incl. illus.
(Rept. no. 1288-10)
(Contract AF 33(616)8391, Proj. 1(7-4156))
Unclassified report

DESCRIPTORS: (*Electron tubes, *Waveguides, *Microwaves, *Frequency multipliers, Electron beams, Harmonic oscillators, Transmission lines, Tests.) Microwaves, Production, Feasibility studies.

The applied research effort will be directed toward the establishment of the feasibility of generating millimeter wave energy through the use of a fast cyclotron wave interaction which results in frequency multiplication. The frequency multiplier which is the subject of the current investigation utilizes the fast cyclotron wave on an electron beam which is focused by a magnetic field and subjected to transverse acceleration at a frequency near the cyclotron resonance of the focusing field. The fast wave appears in the form of transverse rotational electron motion of constant angular velocity corresponding to the electron cyclotron frequency of the magnetic focusing field. If the exciting field is tuned to the cyclotron frequency of the focusing field, the electrons will move in phase with the excitation voltage. An electron initially in an accelerating field will remain in an accelerating field, increasing its kinetic energy and thus its radius of rotation, since angular velocity must remain constant. Electrons initially in a decelerating phase of the field will continue to decelerate, giving up energy and decreasing their radii of rotation eventually moving to the axis of rotation near the center of the beam from which they can be moved only by an accelerating field. (Author)

AD-263 853 Div. 8
(TIPSP/TL) OTS price $9.60

Antenna Lab., Ohio State U. Research Foundation, Columbus.
LUNEBERG LENS SURVEY.
Final engineering rept., Vol. 2, pt. 2, on Research on Electronic Reconnaissance,
by R. C. Rudduck and C. H. Walter. 1 Dec 61, 115p. incl. illus. tables (Rept. no. 903-17)
(Contract AF 33(616)6211)
Unclassified report

DESCRIPTORS: (*Lens antennas, *Conical antennas, *Antennas, *Helical antennas, *Satellite vehicle antennas, *Aerial reconnaissance, *Antenna radiation patterns.) (Mathematical analysis, Design, Theory, Measurement, Electronic equipment, Diodes, Instrumentation, Refractive index, Tables, Electromagnetic waves, Microwaves, Propagation.) (Ferroelectric materials, Semiconductors, Microwave equipment, Radomes, Waveguides, Dielectrics, Phase shifters, Broadband, *Radar antennas.) Radar scanning, Terrain.

A survey of existing circularly symmetric lenses (commonly designated as Luneberg lenses) is given. The variations of index of refraction and contour necessary to obtain particular refraction characteristics are presented and the structures by which these variations can be obtained are discussed. These lenses were found to be quite practical as antennas and reflectors in the microwave region. (Author)

AD-263 869 Div. 8, 30
(TIPSE/JAB) OTS price $19.75

Purdue U. School of Electrical Engineering, Lafayette, Ind.
SPECIFICATIONS AND DATA PRESENTATION IN LINEAR CONTROL SYSTEMS. VOLUME I.
Final rept. vol. 1,
by J. E. Gibson, E. S. McVey and others. May 61, 344p. incl. illus. tables, 124 refs.
(Contract AF 29(600)1993, Proj. 6889)
(AFMDC TR 61-5) Unclassified report

DESCRIPTORS: (*Linear systems, *Control systems, Feedback, Data, Data processing systems, Theory, Sampling.) (Equations, Differential equations, Servomechanisms, Specifications.)

AD-263 882 Div. 8
(TIPSP/WH) OTS price $2.60

Cruft Lab., Harvard U., Cambridge, Mass.
MATCHED FILTERS AND INTERSYMBOL INTERFERENCE,
by Donald W. Tufts. 20 July 61, 19p.
(Technical rept. no. 345)
(Contract Nonr-186616, Proj. NR 372-012)
Unclassified report

DESCRIPTORS: (*Communications theory, *Pulse communication systems, *Radiofrequency filters.) (Radiofrequency filters, *Pulse cables, Radio signals, Pulse modulation, Pulse transmitters, Transmissions.) (Electrical networks, Microwave networks.)

This analysis was conducted to shape a new tool for the design of synchronous, pulse-transmission links. This is accomplished by combining the viewpoints which led to the formulation of two tools of proven worth in communication theory-the matched filter and Nyquist's methods for pulse shaping and transmission line equalization. (Author)

AD-263 893 Div. 8, 2
(TIPSP/GRW) OTS price $2.60

Electrical Engineering Research Lab., U. of Illinois, Urbana.
IONOSPHERIC RESEARCH AND PROPAGATION STUDIES.
Quarterly progress rept. no. 4, 1 Apr-30 June 61, by H. D. Webb. 30 June 61, 25p. incl. illus.
(Contract DA 36-039-sc-85173, Proj. 3A99-20-001-04)
Unclassified report

DESCRIPTORS: (*Radio astronomy, *Ionospheric propagation, *Electromagnetic wave reflections.) (Radio signals, Moon, Reflection.) (Parabolic antennas, Satellite vehicle antennas, Radio interference, Noise (Radio), Measurement.) (Ionosphere, Electrons, Density.)

Progress is reported on: (1) Moving the 28-foot Kennedy Antenna and its associated equipment to the University of Illinois Radio Astronomy Site; (2) obtaining data at the above installation to determine the ionospheric electron content and its fluctuations from lunar radio echoes for analysis; (3) analyzing data measuring scintillations of radio signals from satellites in an attempt to explain such scintillations and to derive from this data information regarding the composition of the ionosphere; and (4) obtaining and analyzing data from lunar radio reflections to determine the brightness distribution of the radio signals. (Author)

AD-263 899 Div. 8, 2
(TIPSP/GRW) OTS price $2.60

Kiruna Geophysical Observatory (Sweden).
THE INFLUENCE OF SOLAR DISTURBANCES ON VERY LOW FREQUENCY RADIO WAVE PROPAGATION OVER A LONG HIGH-LATITUDE PATH,
by Alv Egeland, Bengt Hultqvist, and Johannes Ortner. 15 Apr 61, 27p. incl. illus. table, 37 refs. (Scientific rept. no. 2)
(Contract AF 61(052)418)
(AFCRL-724) Unclassified report

DESCRIPTORS: (*Solar disturbances, *Ionospheric disturbances,*Radio interference, *Radio astronomy.) (Radio waves, Very low frequency, Propagation, Wave transmission, North Sea.) (Sunspots, Solar flares, Magnetic storms, Radio transmission, Magnetic effects, Ionization.)

This analysis deals with the effects of solar and terrestrial disturbances on the propagation conditions on 16 kc radio waves between Rugby, England, (lat 52.2 N) and Kiruna, Sweden, (lat 67.8 N) a distance of about 2 100 km. The most reliable method of long distance radio communication in polar regions during all types of polar blackouts, is to use very low and low frequency radio waves (VLF and LF). The VLF and LF propagation conditions are even better than normal during the existence of absorbing periods, when radio communication over almost the whole frequency range used for long distance communication are interrupted. The VLF propagation may under certain conditions, be a much more sensitive indicator of protons causing polar cap absorption PCA than are riometers. Sudden ionospheric disturbances do not influence the signal strength of 16 kc radio waves on the high latitude path. No direct correlation between sunspot numbers and the yearly average VLF field strength was observed. It was not possible to demonstrate a close correlation between augmentation or diminution of 16 kc signal strength and magnetic storms not associated with PCA. (Author)

AD-263 151 Div. 9, 12
(TIPSP/WLH) OTS price $6.60

AVCO Research Lab., Everett, Mass.
A RATE DAMPING SYSTEM FOR AUGMENTATION OF THE AERODYNAMIC STABILITY OF A SATELLITE,
by Philip O. Jarvinen and Albert J. Merlini.
Aug 61, 66p. incl. illus. table (Research rept. no. 108)
(Contract AF 33(600)41291)
Unclassified report

DESCRIPTORS: (*Hypervelocity vehicles, Deceleration, Atmosphere entry, Damping, Reentry aerodynamics.) (*Satellite vehicles, *Satellite attitude, Stability, Control systems.) Gyroscopes.

The design of a simple, three axis, on-off rate damping system for an aerodynamically stable satellite vehicle operating in the fringes of the earth's atmosphere is discussed. The system provides damping capability to remove vehicle angular velocities after orbit injection and disturbances which perturb the satellite during the orbital phase. The vehicle's natural aerodynamic stability provides the primary attitude control since aerodynamic moments will align the vehicle with the desired reference, the rotating velocity vector. The rate damping system utilizes rate gyro's to measure vehicle angular rates and stored nitrogen gas to provide reaction thrust. (Author)

AD-263 160 Div. 9, 8
(TIPSP/WLH) OTS price $3.60

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
INTERACTION OF ELECTROMAGNETIC WAVES WITH THE PLASMAS OF HYPERSONIC FLOWS,
by Herbert S. Glick. July 61, 31p. incl. illus. 47 refs. (Rept. no. AF-1441-A-5)
(Contract AF 30(602(2267)
(RADC TN 61-173) Unclassified report

DESCRIPTORS: (*Electromagnetic waves, *Plasma physics, *Hypersonic flow, *Magnetohydrodynamics.) (*Shock tubes, Wind tunnel models, Hypersonic wind tunnels.)

The physical, chemical, and aerodynamic aspects of the interaction between electromagnetic waves and hypersonic plasmas are briefly discussed. It is shown that the various aspects of the problem couple strongly and that essential parts of the general problem are still unsolved. The incomplete status of the basic data and the complexity of the general problem suggest experimental model testing. The number of necessary similarity prameters involved is so great that large-scale models must be used in general to obtain useful data. The CAL six-foot hypersonic shock tunnel, in which models of the order of one foot in diameter may be used, is described and its performance capabilities given. The results of some recent tests are discussed. It is concluded that the performance of the tunnel is encouraging from an aerodynamic and chemical purity point of view. The communication blackout problem is considered as a problem to be studied using the CAL shock tunnel. It is shown that two useful approaches can be followed, - one leading to the gathering of test data for various configurations and the other leading to the assessment of the validity of various schemes for the amelioration of the problem. (Author)

AD-263 180 Div. 9
(TIPSP/JSM) OTS price $9.10

Lockheed Aircraft Corp., Marietta, Ga.
STEADY FLOW EJECTOR RESEARCH PROGRAM.
Final rept.,
by J. K. Johnson, Jr., P. K. Shumpert, and J. F. Sutton. Sep 61, 107p. incl. illus. tables (Rept. no. ER-5332)
(Contract Nonr-306700)
Unclassified report

DESCRIPTORS: (*Jet pumps, *Thrust augmentor nozzles, *Jet mixing flow, *Diffusers, Fluid flow, Tests.) Jets, Thrust, Nozzles, Turbojet engines.

An investigation was conducted to determine the jet thrust augmentation factor under steady flow conditions for rectangular parallel-divergent wall ejector configurations with multiple primary nozzles. CONCLUSIONS: The use of an inlet having lemniscate contours for the secondary flow entrance increases ejector performance. An ejector of optimum design using 4 rows of primary nozzles and a constant inlet radius will give about 60% of the theoretical maximum thrust augmentation. Use of curved-wall diffuser entrances rather than mitered diffuser entrances increases ejector thrust augmentation. An optimum design ejector using 4 rows of primary nozzles, a lemniscate secondary inlet, and curved-wall diffuser entrance will have a thrust augmentation of about 61.5% of the theoretical maximum. The optimum position of the primary nozzles is dependent on the nozzle arrangement used and on the shape of the secondary inlet. Ejectors having nonsymmetrical diffusers had lower values of thrust augmentation than symmetrical ejectors. The use of other than a constant area mixing section decrease ejector performance. The best arrangement of multiple primary nozzles is one which apportions an equal geometrical share of secondary flow area to each nozzle. The rows of primary nozzles must be centered in the ejector span to avoid sharply reduced performance.

AD-263 196 Div. 9
(TIPSE/NTM) OTS price $1.25

National Aeronautics and Space Administration, Washington, D. C.
AERODYNAMIC LOAD MEASUREMENTS AND OPENING CHARACTERISTICS OF AUTOMATIC LEADING-EDGE SLATS ON A 45 DEGREE SWEPTBACK WING AT TRANSONIC SPEEDS,
by Donald D. Arabian, Jack F. Runckel, and Charles F. Reid, Jr. Sep 61, 49p. incl. illus. table, 15 refs. (NASA Technical note no. D-900; Supersedes NACA Research memo. L53I30, AD-29 441)
Unclassified report

Also available from NASA, Wash. 25, D. C. as NASA technical note no. D-900.

DESCRIPTORS: (Aerodynamics, *Load distribution, Measurement.) (Automatic, *Wing slots, Moments, Stresses, *Swept-back wings, Wings, Transonics, Tests, Model tests, Wing-body configurations.)

Measurements of the normal force and chord force were made on the slats of a sting-mounted wing-fuselage model through a Mach number range of 0.60 to 1.03 and at angles of attack from 0 degrees to 20 degrees at subsonic speeds and from 0 degrees to 8 degrees at Mach number 1.03. The 20-percent-chord tapered leading-edge slats extended from 25 to 95 percent of the semispan and consisted of five segments. The model wing had 45 degree sweep, an aspect ratio of 3.56, a taper ratio of 0.3. Slat forces and moments were determined for the slats in the almost-closed and open positions for spanwise extents of 35 to 95 percent and 46 to 95 percent of the semispan. The results of the investigation showed little change in the slat maximum force and moment coefficients with Mach number. The coefficients for the open and almost-closed slat positions had similar variations with angle of attack. The loads on the individual slat segments were found to increase toward the tip for moderate angles of attack and decrease toward the tip for high angles of attack. (Author)

AD-263 197 Div. 9, 1
(TIPSE/WAW) OTS price $1.25

National Aeronautics and Space Administration, Washington, D. C.
AERODYNAMIC CHARACTERISTICS, TEMPERATURE, AND NOISE MEASUREMENTS OF A LARGE-SCALE EXTERNAL-FLOW JET-AUGMENTED-FLAP MODEL WITH TURBOJET ENGINES OPERATING,
by Marvin P. Fink. Sep 61, 46p. incl. illus. tables (NASA Technical note no. D-943)
Unclassified report

DESCRIPTORS: (*Jet planes, Model tests, Aerodynamic configurations.) (Aerodynamic heating, Heat transfer, Model tests, *Aerodynamics, Lift, Drag, Load distribution.) (*Flaps, Jets, Experimental data.) (Airplane noise, Jet plane noise, Measurement.)

An investigation was conducted in the Langley full-scale tunnel on a large-scale model powered by turbojet engines with flattened rectangular nozzles. The wing had 35 degrees sweep of the leading edge, an aspect ratio of 6.5, a taper ratio of 0.31, and NACA 651-412 and 65-408 airfoils at the root and tip. The investigation included measurements of the longitudinal aerodynamic characteristics of the model with half-span and full-span flaps and measurements of the sound pressure and skin temperature on the portions of the lower surface of the wing immersed in the jet flow. The tests were conducted over a range of angles of attack from -8 to 16 degrees for Reynolds numbers from 1.8 x 10 to the 6th power to 4.4 x 10 to the 6th power and a range of momentum coefficients from 0 to 2.0. In general, the aerodynamic results of this investigation made with a large-scale hot-jet model verified the results of previous investigations with small models powered by compressed-air jets. Although blowing was only done over the inboard portion of the wing, substantial amounts of induced lift were also obtained over the outboard portion of the wing. Random acoustic loadings on the wing surface were high enough to indicate that fatigue failure from this source would require special consideration in the design of an external-flow jet flap system for an airplane. (Author)

AD-263 206 Div. 9
(TIPSP/JSM) OTS price $1.10

Polytechnic Inst. of Brooklyn, N. Y.
VELOCITIES IN TWO-DIMENSIONAL ASYMMETRIC WAKES. (ADDENDUM),
by Martin H. Steiger and Martin H. Bloom. July 61, 3p. (Addendum to PIBAL rept. no. 707, AD-261 480)
(Contract AF 49(638)217, Proj. 9781)
Unclassified report

DESCRIPTORS: (*Wake, *Velocity, Fluid flow, Fluid mechanics, Gas flow.) (*Boundary layer, *Integral equations, Viscosity, *Compressible flow.)

The purpose of this addendum is to discuss and present a method for calculating the mixing of two streams subject to arbitrarily different inviscid velocities with arbitrary values of the initial thickness of each stream. (Author)

AD-263 222 Div. 9
(TIPSM/REB) OTS price $3.60

Syracuse U. Research Inst., N. Y.
THE SAMPLING OF AEROSOLS IN A TURBULENT AIR FLOW.
Progress rept. no. 5, 1 June-31 Aug 61,
by V. Goldschmidt. 31 Aug 61, 21p. illus.
(Contract DA-CML-18-108-61-G-27)
Unclassified report

DESCRIPTORS: (*Aerosols, Gas flow, Turbulent flow, Sampling, Counting methods.) (Drops, Microanalysis, Surface tension.) (*Aerosol generators, Anemometers, Wind tunnels.)

The use of La Mer generator as an aerosol source was abandoned. Although the results were not useful for this study, the time spent was profitable in the over-all plan for producing monodispersed aerosols in adequate size and sufficient concentration. The variations of output with nucleizer current were noted as too low for the desired test conditions. Prior to observations of the particle size distribution and mass output from a Vaponefrin nebulizer, an evaluation was made on the spread of liquid drops on a clean glass slide. For droplets between 2 and 30 microns, the spread factor was noted to increase with size. A small scale wind tunnel is being constructed in order to evaluate the limitations and determine the calibrations of a hot wire anemometer as a counting device in an aerosol stream. By sampling isokinetically through a filter, the count obtained on the hot wire anemometer will be correlated to the true concentration. For the initial runs a nebulizer was selected as a generator for a dibutyl phthalate aerosol. (Author)

AD-263 281 Div. 9, 25
(TIPSP/JVP) OTS price $1.00

National Aeronautics and Space Administration, Washington, D. C.
AN APPROXIMATE ANALYSIS OF FILM COOLING ON BLUNT BODIES BY GAS INJECTION NEAR THE STAGNATION POINT,
by Byron L. Swenson. Sep 61, 39p. incl. illus. tables (NASA Technical note D-861)
Unclassified report

Also available from NASA, Wash. 25, D. C. as NASA Technical note D-861.

DESCRIPTORS: (*Re-entry vehicles, *Blunt bodies, *Film cooling, Gas flow, Laminar boundary layer, Heat transfer, Mathematical analysis.)

An approximate method for the estimation of laminar heat transfer to blunt bodies with gaseous film cooling is developed. Attention is focused on the parameters which are important for the design of an attractive heat protection system. Application of the analysis is made to calculate the approximate coolant weight requirement for both a circular and a parabolic entry. (Author)

AD-263 283 Div. 9, 4
(TIPSP/WLH) OTS price $.75

National Aeronautics and Space Administration, Washington, D. C.
EFFECT OF SURFACE PREPARATION AND GAS FLOW ON NITROGEN ATOM SURFACE RECOMBINATION,
by George M. Prok. Sep 61, 22p. incl. illus. tables, 16 refs. (NASA Technical note D-1090)
Unclassified report

Also available from NASA, Wash. 25, D. C. as NASA Technical note D-1090.

DESCRIPTORS: (*Nitrogen, Atoms, *Recombination reactions, Catalysis, Gas flow.) (*Surface properties, Copper, Platinum, Surfaces, Metal films.) (Satellite vehicles, Superaerodynamics.) Glass.

The fraction of nitrogen atoms that recombine upon striking copper and platinum surfaces in a partly dissociated stream was determined. Vacuum-evaporated films and bulk metal samples subjected to various surface treatments were used. The results were independent of flow conditions and atom concentration. A glass substrate affected the activity of copper films, but not platinum. Simple surface treatments of bulk metal samples yielded recombination coefficients comparable to those of vacuum-evaporated films, which are about 0.03 for platinum and 0.04 for copper. (Author)

AD-263 376 Div. 9, 1
(TIPSE/WAW) OTS price $11.50

Hiller Aircraft Corp., Palo Alto, Calif.
INVESTIGATION OF SPECIAL GROUND EFFECT MACHINE CONFIGURATIONS.
Final rept.,
by M. F. Gates. Dec 60, 152p. incl. illus. tables (Rept. no. ARD-284)
(Contract Nonr-302300)
Unclassified report

DESCRIPTORS: (*Flying platforms, *Aerodynamics, Stability, Model tests, Mathematical analysis, Power, Design, Experimental data, Subsonic flow.) (Diffusers, Pressure, Experimental data, Subsonic flow.) *Ground effect.

The evaluation was continued of 2 unique GEM configurations (diffuser-recirculation and diffuser-plenum). The prime emphasis was to investigate and document the performance and stability characteristics of the 2 concepts, and to determine means of achieving the required positive stability characteristics. The investigation was accomplished with 2-dimensional model tests and supporting mathematical studies. The stability was demonstrated with 3-dimensional, free-flight model tests. Static 3-dimensional model tests documented the performance of an inherently stable configuration of the original concept. The 3-dimensional model static test data of the diffuser-plenum GEM indicates that a performance of 3.26 air horsepower per square foot of gap area can be attained at a planform loading of 20 psf. The off-design hover performance is also presented. Data is presented which describes the characteristics of the diffuser edge seal and exit gap as components of the GEM. This data describes the hover performance, the pitch and heave stability characteristics, the lifting efficiency, the diffuser pressure rise and a continuity parameter, which is the ratio of diffuser exit flow to the flow supplied to the diffuser. (Author)

AD-263 450 Div. 9
(TIPSE/NTM) OTS price $17.00

General Electric Co., Cincinnati, Ohio.
RESULTS OF WIND TUNNEL TESTS OF A FULL SCALE FUSELAGE MOUNTED, TIP TURBINE DRIVEN LIFT FAN. VOLUME 2. ADDITIONAL 30 HOURS OF WIND TUNNEL TESTS. SEPTEMBER-DECEMBER 1960.
Apr 61, 265p. incl. illus. tables.
(Contract DA 44-177-tc-584, Proj. 9R38-01-020-02)
(TREC TR 61-15, vol. 2)
Unclassified report

DESCRIPTORS: (*Short take-off planes, Wind tunnel models, *Wind tunnels, *Shrouded propellers, Acceleration, Deceleration, Model tests, Lift, Drag, Moments, Tails, Pitch, Stability, Torque, Aerodynamics.) (Instrumentation, Measurement, Test methods, Test facilities, Test equipment.)

Analyses of the results are presented in considerable depth defining fan hover performance and variation with flight speed, comparing fan powered with basic aircraft performance and calculating various transition performance characteristics and configuration requirements for cases of maximum acceleration, maximum climb, controlled descent, unaccelerated level flight and short take off (with and without overloads). (Author)

AD-263 527 Div. 9
(TIPSM/TLG) OTS price $8.10

Guggenheim Aeronautical Lab., Calif. Inst. of Tech., Pasadena.
EXPERIMENTAL STUDY OF HELIUM AND ARGON DIFFUSION IN THE WAKE OF A CIRCULAR CYLINDER AT MACH NUMBER 5.8.
Rept. on Hypersonic Research Project,
by Louis Kingsland, Jr. 1 June 61, 74p. incl. illus. tables (Memo. no. 60)
(Contracts DA 04-495-ORD-1960 and DA 04-495-ORD-3231)
Unclassified report

DESCRIPTORS: (*Re-entry aerodynamics, Theory.) (*Cylindrical bodies, Wake, Aerodynamics, *Hypersonics.) (*Hypersonic flow, *Turbulent flow, Gas diffusion, Analysis, Test methods, Thermal conductivity, Argon, Helium.) (*Hypersonic wind tunnels, Instrumentation.)

Experimental measurements of the diffusion of helium and argon in the wake of a porous cylinder were made in the hypersonic wind tunnel at Mach 5.8. The cylinder was mounted perpendicular to the flow and small quantities of tracer gas were pumped through the model walls into the flow. The thermal conductivity method of gas analysis was used to determine the concentration of sample gases extracted from points in the wake. The transverse and axial distribution of concentration appeared to follow theoretical estimates of similarity behavior. Injection of tracer gas was found to have a measurable effect on stagnation pressure and this effect was taken into account during computations. Numerical values of diffusion coefficients along the wake centerline were computed from the experimental data and then compared with theoretical values for laminar flow. Close agreement between experimental and theoretical values when the Reynolds number reached 18,000 verified that the innen wake was laminar as far downstream as measurements could be made (15 diameters). At a Reynolds number value of 72,000, the data showed that mixing processes were 3 times more rapid for helium, and 10 times more rapid for argon, than those expected in laminar flow. (Author)

AD-263 529 Div. 9, 25
(TIPSP/WH) OTS price $10.00

Institute for System Research, U. of Chicago, Ill.
DETERMINING AIR REACTIONS ON MOVING VEHICLES. PART IV. METHODS OF AERODYNAMICS-ELEMENTARY BODIES,
by M. Z. Krzywoblocki. Aug 60, 946p. incl. illus. tables.
(Contract AF 33(616)5689, Proj. 7060)
(WADC TR 56-51, pt. 4) Unclassified report

DESCRIPTORS: (*Aerodynamics, Gas flow, Upper atmosphere, Drag.) (*Superaerodynamics, Kinetic theory, Heat transfer, Entropy.) (*Magnetohydrodynamics, Boundary layer, Electrons, Turbulence.)

The methods of aerodynamics are described which are mainly concerned with the flow of a viscous gas and the drag due to viscosity in continuum, as well as with the flow of a highly rarefied gas in the high altitude domain where the notion of continuum is no longer valid. (Author)

AD-263 572 Div. 9
(TIPSE/NTM) OTS price $.75

National Aeronautics and Space Administration, Washington, D. C.
MEASUREMENT OF FLOW ANGULARITY AT SUPERSONIC AND HYPERSONIC SPEEDS WITH THE USE OF A CONICAL PROBE,
by Frank E. Swalley. Sep 61, 22p. incl. illus.
(NASA Technical note D-959)
Unclassified report

Also available from NASA Wash. 25, D. C. as NASA Technical note D-959.

DESCRIPTORS: (*Hypersonic flow, Measurement, Supersonics, Hypersonics, *Conical bodies, Flight speeds, Flight testing, *Cylindrical bodies.) (Model tests, Wind tunnel models, Hypersonic wind tunnels, Pressure.)

The characteristics of a 40 degrees half-angle cone for measuring flow angularity were determined experimentally. Tests were conducted at a Mach number of 21 in helium with check points at Mach number 3.55 in air for angles of pitch up to 5 degrees. The air tests confirmed theoretical indications of small or negligible Mach number and test-medium effects for the case of air and helium. The instrument is capable of measuring flow angularity at high Reynolds numbers and speeds greater than that necessary for shock attachment to within + or - 1/3-degrees. (Author)

AD-263 589 Div. 9
(TIPSP/WH) OTS price $5.60

New York U. Coll. of Engineering, N. Y.
DROP COALESCENCE.
Final rept.,
by R. M. Schotland and John L. Hale. July 61, 59p. incl. illus. 31 refs.
(Contract AF 19(604)6145)
(AFCRL-842) Unclassified report

DESCRIPTORS: (*Laboratories, *Fluid mechanics, Hydrodynamics, Model tests, Instrumentaion, Spheres.) (*Drops, Clouds, Fluid mechanics, *Aerosols, Water impingement.)

I. A modeling technique for measuring the velocity components of air surrounding a falling cloud drop is described. The drop is modeled by a suspended brass sphere which is lowered at a controlled rate through a viscous fluid. A preplaced tracer line of black ink drops is photographed as it describes the position of a fluid streamline around the sphere. II. An analysis is made of the penetration of a water drop into a plane water surface under the assumption that a thin gaseous film separates the two liquid surfaces. The penetration equation is written in terms of a coalescence parameter pi sub c. The ratio of penetration to drop diameter is a constant in the restricted range in which pi sub c is a constant. III. Instrumentation is described which permits the study of a succession of colliding liquid drops. The design permits free adjustment of the drop sizes, impact angles, and velocities. (Author)

AD-263 597 Div. 9
(TIPSE/RD) OTS price $6.60

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
THE INFLUENCE OF TWO-DIMENSIONAL STREAM SHEAR ON AIRFOIL MAXIMUM LIFT,
by R. J. Vidal, J. T. Curtis, and J. H. Hilton. Aug 61, 61p. incl. illus. tables (Rept. no. A1-1190-A-7)
(Contract DA 44-177-tc-439, Proj. 9R-38-01-000)
(TREC TR 61-93) Unclassified report

DESCRIPTORS: (Aerodynamics, *Airfoils, *Short take-off planes, *Vertical take-off planes, Wings, Gas flow, Experimental data, Take-off, Landing, Laminar boundary layer, Flight speeds, Jets, *Lift.) (Mathematical analysis, Pressure, Model tests, Perturbation theory.)

The effects of stream velocity gradients on airfoil maximum lift are defined with experimental data obtained in a simulated two-dimensional slipstream. The experimental results show that when positioned near the slipstream plane of symmetry, the airfoil maximum lift varies markedly with location in the slipstream. In moving the airfoil from above to below the slipstream plane of symmetry through a total distance corresponding to the airfoil thickness, force data and boundary-layer observations show that boundary-layer separation is delayed to higher angles of attack, and the airfoil maximum lift is doubled. It is concluded that the destalling effect observed in the nonuniform slipstream is not associated with slipstream boundary interference, but stems from the influence of the large local slipstream shear on airfoil characteristics. The effects of uniform and nonuniform shear on airfoil lift and pressure distribution are discussed, within the framework of existing first-order, small-shear theory, to show that these effects of shear tend to promote stall. A Pohlhausen calculation of the laminary boundary layer in a stream with shear is used to identify and to assess the effects of stream shear on boundary-layer separation criteria.

AD-263 648 Div. 9
(TIPSP/TL) OTS price $2.60

Wyle Labs., El Segundo, Calif.
EVALUATION TESTING OF FLOW SAMPLING WEDGE,
by L. N. Mortonson and R. K. Pearson. 17 July 61, 20p. incl. illus. tables (Test rept. no. 10299-1)
(Contract AF 04(647)398)
(BSD TR 61-53) Unclassified report

DESCRIPTORS: (*Wedges, *Gas flow, *Fluid flow.) (Tests, Injection, Pressure.) (Pressure gages, Flowmeters, Control valves, Anemometers, Manometers, Pitot tubes, Pressure regulators, Vacuum pumps, Water filters, Water tanks, Thermocouples, Tables, Photography.) (Liquid rocket propellants, Liquids, Gases, Loading, Contamination, Sampling, Determination.)

The purpose of this test program was to evaluate the suitability of a Wedge-Type Flow Sampling System for use in an Air Force Base Propellant Loading System and other liquid and gas flow systems where contaminant levels are to be determined under full flow conditions. The flow sampling system was designed and manufactured by Wyle Laboratories, El Segundo, California. A detailed description of the Wedge-Type Flow Sampling System, and the test program which was performed to evaluate the performance of the sampling system, is included. (Author)

AD-263 714 Div. 9, 25
(TIPSP/MA) OTS price $5.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
VERIFICATION OF A THEORETICAL METHOD OF DETERMINING DISCHARGE COEFFICIENTS FOR VENTURIS OPERATING AT CRITICAL FLOW CONDITIONS,
by Robert E. Smith, Jr. and Roy J. Matz. Sep 61 56p. incl. illus. (AEDC TR 61-8)
(Contract AF 40(600)800, Proj. 931002)
Unclassified report

DESCRIPTORS: (*Aerodynamics, *Venturi tubes, Flowmeters, Nozzles, Axially symmetric flow.) (*Gas flow, Gas discharges, Boundary layer, Conical bodies, Conical nozzles, Cylindrical bodies, Turbulence, Laminar boundary layer, Flowmeters.) Mach number, Pressure, Reynolds number, Pitot tubes.

A venturi contour designed specifically for use at critical flow conditions is described, and a theoretical method is presented for determining the discharge coefficient of this venturi. An experimental investigation was conducted to determine the discharge coefficient of such a venturi, and the results are compared with the theoretical values. This investigation covered a range of Reynolds number from 0.4 x 10 to the 6th power to 5.4 x 10 to the 6th power based on venturi throat diameter. The venturi used had a throat diameter of 5.6436 in. and an airflow capacity of 8.6 lb/sec at an inlet total pressure of one atmosphere and an inlet total temperature of 519 R. The values of discharge coefficient ranged from 0.992 to 0.994, and the theoretically and experimentally determined coefficients agreed within ±0.06% over the range of conditions investigated. (Author)

AD-263 766 Div. 9
(TIPSE/WAW) OTS price $.75

National Aeronautics and Space Administration, Washington, D. C.
EFFECTS OF MACH NUMBER, LEADING-EDGE BLUNTNESS, AND SWEEP ON BOUNDARY-LAYER TRANSITION ON A FLAT PLATE,
by Don W. Jillie and Edward J. Hopkins. Sep 61, 30p. incl. illus. 10 refs. (Technical note no. D-1071)
Unclassified report

Also available from NASA, Wash. 25, D. C., as NASA Technical note no. D-1071.

DESCRIPTORS: (*Airfoils, Swept back wings, Triangular wings, Aerodynamics, Supersonics, Aerodynamic configurations, Reynolds number, Mach number.) (Boundary layer, *Laminar boundary layer, *Turbulent boundary layer, Measurement, Separation, Turbulence.)

The effects of leading-edge bluntness and sweep on boundary-layer transition on flat plate models were investigated at Mach numbers of 2.00, 2.50, 3.00, and 4.00. The effect of sweep on transition was also determined on a flat plate model equipped with an elliptical nose at a Mach number of 0.27. Models used for the supersonic investigation had leading-edge radii varying from 0.0005 to 0.040 inch. The free-stream unit Reynolds number was held constant at 15 million per foot for the supersonic tests and the angle of attack was 0 degrees. Surface flow conditions were determined by visual observation and recorded photographically. For the models with the blunter leading edges, the transition Reynolds number (based on free-stream flow conditions) was approximately doubled by an increase in Mach number from 2.50 to 4.00; and nearly the same result was predicted from shock-loss considerations. At all supersonic Mach numbers, increases in sweep reduced the transition Reynolds number and the amount of reduction increased with increases in bluntness. The shock-loss method considerably underestimated the sweep effects, with swept wings. (Author)

AD-263 767 Div. 9
(TIPSE/WAW) OTS price $1.00

National Aeronautics and Space Administration, Washington, D. C.
SOME EFFECTS OF LEADING-EDGE SWEEP ON BOUNDARY-LAYER TRANSITION AT SUPERSONIC SPEEDS, by Gary T. Chapman. Sep 61, 33p. incl. illus. 17 refs. (NASA Technical note no. D-1075)
Unclassified report

Also available from NASA, Wash. 25, D. C., as NASA Technical note no. D-1075.

DESCRIPTORS: (*Swept-back wings, Swept wings, Wings, *Supersonics, Aerodynamics.) (Boundary layer, *Laminar boundary layer, Mathematical analysis, Turbulence.) Shock waves.

The effects of crossflow and shock strength on transition of the laminar boundary layer behind a swept leading edge have been investigated analytically and with the aid of available experimental data. An approximate method of determining the crossflow Reynolds number on a leading edge of circular cross section at supersonic speeds is presented. The applicability of the critical crossflow criterion described by Owen and Randall for transition on swept wings in subsonic flow was examined for the case of supersonic flow over swept circular cylinders. A wide range of applicability of the subsonic critical values is indicated. The corresponding magnitude of crossflow velocity necessary to cause instability on the surface of a swept wing at supersonic speeds was also calculated and found to be small. The effects of shock strength on transition caused by Tollmien-Schlichting type of instability are discussed briefly. Changes in local Reynolds number, due to shock strength, were found analytically to have considerably more effect on transition caused by Tollmien-Schlichting instability than on transition caused by crossflow instability. Changes in the mechanism controlling transition from Tollmien-Schlichting instability to crossflow instability were found to be possible as a wing is swept back and to result in large reductions in the length of laminar flow. (Author)

AD-263 778 Div. 9, 25
(TIPSP/WH) OTS price $4.60

Institute of Engineering Research, U. of Calif., Berkeley.
ON THE COLLAPSE OF A SPHERICAL CAVITY IN WATER, by N. Schwartz. July 61, 42p. incl. illus. tables, 22 refs. (Series no. 177, Issue no. 2) (Contract Nonr-22279)
Unclassified report

DESCRIPTORS: (*Cavitation, Vapors, *Bubbles, *Fluid mechanics, Water.) (Motion, Equations.) (Mathematical analysis, Partial differential equations, Perturbation theory.)

Contents:
Formulation of the Problem
Similarity and Dimensional Techniques
The Role of Energy
The Model
The Equations of Motion, Boundary and Initial Conditions
Cavity Collapse with a Fixed Sound Speed at the Cavity Wall
Perturbation Theory
Boundary Conditions
The Self-Similar Equations
Analysis of the Non-Self-Similar Equations
Analysis at the Cavity Wall
Analysis at the Singular Point x = 1.51

AD-263 796 Div. 9
(TIPSP/WH) OTS price $1.00

National Aeronautics and Space Administration, Washington, D. C.
INVESTIGATION OF THE LOW-SUBSONIC STABILITY AND CONTROL CHARACTERISTICS OF A FREE-FLYING MODEL OF A THICK 70 DEGREE DELTA REENTRY CONFIGURATION, by John W. Paulson and Robert E. Shanks. Oct 61, 34p. incl. illus. table (Technical note no. D-913)
Unclassified report

Also available from NASA, Wash. 25, D. C., as NASA Technical note D-913.

DESCRIPTORS: (*Re-entry vehicles, *Triangular wings, Subsonic flow, Wind tunnels, Wind tunnel models.) (*Stability, Measurement, Test methods, Control.)

The longitudinal stability and control characteristics were considered satisfactory when the model had positive static longitudinal stability. It was possible to fly the model with a small amount of static instability, but the longitudinal characteristics were considered unsatisfactory in this condition. At angles of attack above the stall the model developed a large, constant-amplitude pitching oscillation. The lateral stability characteristics were considered to be only fair at angles of attack from about 20 deg to 35 deg because of a lightly damped Dutch roll oscillation. At higher angles of attack the oscillation was well damped and the lateral stability was generally satisfactory. The Dutch roll damping at the lower angles of attack was increased to satisfactory values by means of a simple rate-type roll damper. The lateral control characteristics were generally satisfactory throughout the angle-of-attack range, but there was some deterioration in aileron effectiveness in the high angle-of-attack range due mainly to a large increase in damping in roll. (Author)

AD-263 797 Div. 9
(TIPSP/WH) OTS price $1.00

National Aeronautics and Space Administration, Washington, D. C.
FREE-FLIGHT OBSERVATION OF A SEPARATED TURBULENT FLOW INCLUDING HEAT TRANSFER UP TO MACH 8.5,
by Dudley George McConnell. Oct 61, 40p. incl. illus. table, 14 refs. (Technical note no. D-278)

Unclassified report

Also available from NASA, Wash. 25, D. C., as NASA Technical note D-278.

DESCRIPTORS: (*Turbulent boundary layer, *Heat transfer, Hypersonic flow, Tables.) (*Blunt bodies, Aerodynamic configurations, Gas flow, Guided missile noses.)

A turbulent boundary layer separated by a forward-facing step was observed on the cylindrical portion of a hemisphere-cone-cylinder test vehicle. Tip blunting, producing a shear flow, was found to induce higher pressures on the cylindrical portion than were predicted from ballistic tunnel data of unblunted projectiles. An approximate method for predicting this blunt-body pressure distribution was hypothesized. These findings, along with the hypothesis, were substantiated by a wind tunnel test of a similar body. The peak pressure ratios of the separation were smaller in magnitude than flat plate theory predicted because of the effect of the shear flow. The decrement in heating of the separated flow, relative to the corresponding attached flow, was found to compare well with the expected results. (Author)

AD-263 833 Div. 9, 25, 4
(TIPSM/BRW) OTS price $1.60

Delaware U., Newark.
ENGINEERING PROPERTIES OF NON-NEWTONIAN FLUIDS. Final rept.,
by A. B. Metzner. Aug 61, 17p. 35 refs.
(Contract DA 36-034-ORD-1495, Proj. TB2-0001 (1074))
(AROD rept. no. 1074:16)

Unclassified report

DESCRIPTORS: (*Liquids, Fluids, Gels, Viscosity, Elasticity, Fluid mechanics, Fluid flow, Turbulence, Turbulent flow, Stirrers, Impellers, Ducts, Heat transfer, Diffusion, Theory, Shear stresses, Measurement.)

Methods for predicting accurately the onset of turbulence and the pressure drop characteristics of ducted, turbulent non-Newtonian fluids were developed for the simplest class of non-Newtonian systems, viz., purely-viscous materials. Semi-quantitative measurements have shown the suppression of turbulence possible in viscoelastic systems. Agitation of non-Newtonian systems in cylindrical tanks was studied; methods for the prediction of the power required for such agitation has been developed to substantially the same level as for Newtonian fluids. Application of the analogy between rates of heat or mass transfer and the rate of momentum transfer enabled the direct application of the studies of turbulence in purely-viscous systems to the prediction of heat transfer rates in these fluids under turbulent flow conditions. The general Eyring rate theory was extended to encompass diffusion in slurries and in non-Newtonian fluids. (Author)

10. FUELS AND COMBUSTION

AD-263 122 Div. 10
(TIPSM/REB) OTS price $1.10

Texaco Experiment Inc. Richmond, Va.
COMBUSTION OF ELEMENTAL BORON.
Quarterly summary rept. Feb - Apr 61,
by Claude P. Talley and Harry P. Woods. 1 May 61, 10p. incl. illus. (Rept. no. TM-1272; EXP 223)
(Contract Nonr-188300)

Unclassified report

DESCRIPTORS: (Solid rocket propellants, Rocket fuels, Jet engine fuels, *Boron, *Combustion, Oxidation, Reaction, kinetics, Chemical reactions, Pressure, Temperature.) (*Rocket oxidizers, Chlorine compounds, Fluorides.) (Rocket oxidizers, Boron compounds, Fluorides.)

The combustion of high-purity boron rods (1 to 2 mm in diameter) in ClF3 is self-igniting at room temperature and self-sustaining. Preliminary experiments indicate that the rate is comparatively independent of temperature and that the maximum temperature of the boron in this oxidizer before complete comsumption of the rod is considerably less than in oxygen (approximately 1600 K versus 2400 K). Qualitative experiments with BrF3 as oxidizer indicate a consumption of boron less than one-tenth that in ClF3. (Author)

AD-263 328 Div. 10, 12
(TIPSM/SEB) OTS price $8.60

Bell Aerosystems Co., Buffalo, N. Y.
STORABLE PROPELLANT DATA FOR THE TITAN II PROGRAM,
Progress rept. for 1 Dec 60-17 Apr 61,
by Ralph R. Liberto. July 61, 86p. incl. illus. tables, 12 refs. (Rept. no. 8182-933001)
(Contract AF 04(647)846)
(AFBMD TR 61-55)

Unclassified report

DESCRIPTORS: (Guided missiles, Surface to surface, Rocket fuels, *Liquid rocket propellants, *Rocket oxidizers, Heating, Thermodynamics, Thermochemistry, Vapor pressure, Physical properties, Storage, Aging, Hazards, Combustion, Detonation, Ignition, Explosions, Tables.) (*Rocket fuels, Decomposition, Contamination, Materials.) (*Rocket oxidizers, Nitrogen compounds, Tetroxides, Liquid rocket propellants, Methyl hydrazines, Hydrazines.) (*Rocket fuels, Corrosive liquids, Corrosion, Lubricants, Metals, Steel, Aluminum alloys, Coatings, Wood, Concrete, Plastics, Polymers, Elastomers, Containers, Cleaning.)

Presented is heat capacity data for the Titan II propellants, N2O4 as the oxidizer and a 50/50 blend of UDMH and N2H4 as the fuel. The vapor pressure is affected slightly when measurements are made at different ullages. Tests were conducted to determine the effect these propellants have on metals and nonmetals and the effect of metals and contaminants on fuel blend decomposition. Various fuel blend mixing techniques were evaluated using laboratory quantities of UDMH and N2H4. Storability data is presented for the fuel blend at 60 ± 5 F and at 200 F. Various cleaning and flushing procedures were evaluated by flowing these propellants through thrust chamber bipropellant valves, flushing the valves, and storing them for 90 days. (Author)

AD-263 347 Div. 10, 25
(TIPSP/JSM) OTS price $1.60

Rocket Power, Inc., Pasadena, Calif.
THERMODYNAMICS OF REACTIONS INVOLVING LIGHT METAL OXIDES AND PROPELLANT GASES.
Quarterly rept. no. 5, 9 May-9 Aug 61,
by H. Petersen, J. Blauer and M. Farber. 9 Aug 61, 12p. incl. illus. tables (Rept. no. QR-1987-5)
(Contract DA 04-495-ORD-1987)
Unclassified report

DESCRIPTORS: (*Aluminum compounds, *Oxyfluorides, *Heat of formation, Oxides, Fluorides, Chemical reactions.) (*Boron compounds, Boric acids, Chemical reactions, Oxides, Water.) (Solid rocket propellants, Aluminum compounds, Boron compounds, *Thermodynamics, Exhaust gases.)

The validity of the Molecular Flow Reaction Method has been established by a study of the HBO2 molecule. Preliminary experiments on the reaction between Al2O3 and AlF3 have been made toward obtaining a value of the heat of formation of AlOF. These have contributed to the design of apparatus which offers promise of giving a definite value. (Author)

AD-263 407 Div. 10, 16, 28
(TIPSB/LH) OTS price $3.60

Directorate of Rocket Propulsion, Air Force Systems Command, Edwards Air Force Base, Calif.
EFFECTS ON MENTAL FUNCTIONING OF PERSONNEL WORKING WITH PENTABORANE AS A ROCKET ENGINE FUEL,
by Glory Sturiale. Aug 61, 33p. incl. illus.
(SSD TN 61-3) Unclassified report

DESCRIPTORS: (Rocket propellants, *Pentaboranes, Handling, Toxicity.) (Maintenance personnel, Psychology, Psychoses, Diagnosis, Medical examination.)

Psychodiagnostic testing was administered to personnel with a work history on this pentaborane project. These tests consisted of questions referring to neuropsychiatric and psychosomatic symptoms, the results of which were related to job adjustment as measured by several criteria. While the analysis of findings did not reveal statistically significant relationships, at least in a critical sense, there was some evidence suggestive of the practical usefulness of such tests. Information obtained from these psychological measuring tools was seen to serve a purpose as part of the personal medical history to assist physicians in diagnosing complaints of propellant intoxication, the symptomatology of which is not often clear. Secondly, there is their suggested use as reference material for job placement purposes in R and D programs having a potentially hazardous environment. (Author)

AD-263 435 Div. 10, 30
(TIPSM/REB) OTS price $2.60

Naval Ordnance Test Station, China Lake, Calif.
MEASUREMENT PROBLEMS IN RESEARCH ON UNSTABLE COMBUSTION OF SOLID ROCKET PROPELLANTS,
by H. B. Mathes. 16 Aug 61, 22p. incl. illus. tables (Rept. no. NOTS TP 2602)
(NAVWEPS rept. no. 7606)
Unclassified report

DESCRIPTORS: *Solid rocket propellants, *Rocket motors, *Combustion, Stability, *Jet acoustic oscillations, Oscillation, High frequency, Vibration, Analysis, Measurement, Instrumentation, *Data processing systems, *Recording systems, *Magnetic recording systems, Oscilloscopes, Pressure gages, Transducers, Digital computers, Oscillographs, Galvanometers.

Several measurement problems which have been encountered in a long-range U. S. Navy research program on solid propellant combustion instability are discussed. Topics included are: (a) behavior of several types of high-frequency response pressure gages, (b) difficulties in detecting high-frequency pressure oscillations, (c) techniques in recording and storing detected data, and (d) methods used in recovery and analysis of recorded data. (Author)

AD-263 440 Div. 10, 30
(TIPSM/EJH) OTS price $10.50

Princeton U., N. J.
THE IGNITION MECHANISM OF COMPOSITE SOLID PROPELLANTS,
by Robert F. McAlevy, III. 1 June 61, 139p. incl. illus. tables, 89 refs. (Aeronautical engineering laboratony rept. no. 557)
(Contract AF 49(638)411)
(AFOSR-1220) Unclassified report

DESCRIPTORS: (*Solid rocket propellants, Ignition, Test equipment, Shock tubes, Photoelectric cells, Photographic analysis.) (*Rocket oxidizers, Ammonium radicals, Perchlorates, Rocket fuels, Epoxy resins, Resins, Vaporization, Ignition, Theory, Pyrolysis, Combustion, Thermochemistry, Reaction kinetics, Heat transfer, Gases, Oxygen.) (*Shock tubes, Heat, Temperature, Gases, Shock waves, Ignition.)

Evidence points to gas phase heat evolution as the controlling mechanism for the steady-state deflagration process of solid propellants. Generally, this takes the form of a measured decrease of the ignition time lag with increasing oxygen concentration of the ignition gas. The study of this effect in the ignition of NH_4ClO_4 composite propellants is discussed. The shock tube was selected as the basic tool for this research. All of the quantitative experiments, designed to verify the gas phase ignition theory were executed by exposing small specimens of propellants to an instantaneous, controlled, heat input. This was accomplished by reflecting impinging shock waves from their exposed, flat, surfaces. As the igniting gas composition was vitiated with N the measured ignition time lags increased from a few hundred microseconds in a mixture of 100% O2, 0% N2, to 5 milliseconds in a mixture of 40% O2, 60% N2. This evidence led to an ignition mechanism based on a gas phase heat release due to the reaction between the vaporized fuel component of the propellant and the oxygen component of the ignition gas. (Author)

AD-263 445 Div. 10, 25
(TIPSM/EJH) OTS price $4.60

Aeronutronic, Newport Beach, Calif.
AN EXPERIMENTAL PROGRAM FOR OBTAINING THE THERMODYNAMIC PROPERTIES OF PROPELLANT COMBUSTION

PRODUCTS.
Quarterly technical summary rept. no. 1,
by D. L. Hildenbrand and L. P. Theard.
15 Sep 61, 42p. incl. illus. tables, 19 refs.
(Aeronutronic publication no. U-1376)
(Contract NOw 61-0905-c)
(ARPA Order no. 22-61) Unclassified report

DESCRIPTORS: (*Solid rocket propellants, Combustion, Vaporization, Vapors, *Combustion chamber gases, Analysis, Mass spectroscopy, Gas diffusion, Thermochemistry, Thermodynamics.) (*Aluminum compounds, *Nitrides, Crystals, Vaporization, Dissociation, Condensation, Thermochemistry.) (*Gold, Heat of sublimation, Thermochemistry.) (*Lithium compounds, *Aluminum compounds, *Fluorides, Mixtures, Vaporization, Thermochemistry.) (*Magnesium compounds, *Fluorides, *Boron compounds, Oxides, *Nitrides, Vaporization, Vapors, Polymers, Molecules, Thermochemistry.)

This report includes:
THE VAPOR PRESSURE AND HEAT OF SUBLIMATION OF GOLD, by D. L. Hildenbrand and W. F. Hall. 9p. incl. illus. tables.
(Contract NOrd-17980)

The heat of the reaction, (OBF)3 yields 3 OBF, at 1200 K was derived at 140.2 + or - 15 kcal. The value -141 + or - 5 kcal/mole was established for the heat of formation for the gaseous OBF monomer at 298 K. Torsion-effusion measurements of the dissociation pressure of AlN from 1700 to 1900 K yielded a condensation coefficient of less than or equal to 0.002. The heat of formation of crystalline AlN at 298 K was calculated as -70.7 + or - 2.5 kcal/mole. A second law heat of vaporization of B2O3 was derived from vaporization studies from which heat of formation and entropy values were derived. Studies indicated that AlF3 and LiAlF4 mixtures vaporize to AlF3 and LiAlF4 gaseous molecules.

AD-263 591 Div. 10
(TIPSM/EJH) OTS price $6.60

Thiokol Chemical Corp., Elkton, Md.
A RESEARCH STUDY TO ADVANCE THE STATE-OF-THE-ART OF SOLID PROPELLANT GRAIN DESIGN. VOLUME I. TECHNICAL INFORMATION.
Quarterly progress rept. no. 6, 1 Mar-1 June 61.
by Gerald R. Dolan, E. Fred Manolakos, and others. 27 June 61, 66p. incl. illus. table
(Rept. no. E99-61, vol. 1)
(Contract AF 33(616)6530, Proj. 3059)
Unclassified report

DESCRIPTORS: (*Solid rocket propellants, *Propellant grains, Design, Configuration, Ballistics, Combustion, Theory, Thermodynamics, Heat transfer, Stresses, Viscosity, Elasticity, Photoelasticity, Mechanical properties.) (*Propellant grains, Test methods, Instrumentation, Stresses, Photographic analysis, Radiographic analysis, Programming.)

Contents:
GENERALIZED GRAIN DESIGN:
Analysis of head and aft end effects
Analysis of the effect of propellant defects
PHOTOSTRESS ANALYSIS OF PROPELLANT GRAINS
Theoretical analyses
Experimental program
PROPELLANT DEFECT STUDIES
Literature search
Description of experimental program
HEAT TRANSFER ANALYSIS
Theoretical considerations
Experimental program
CORE DESIGNS FOR PHOTOSTRESS STUDY

AD-263 613 Div. 10
(TIPSM/SEB) OTS price $4.60

Naval Weapons Evaluation Facility, Albuquerque, N. Mex.
A METHOD FOR PREDICTING THE TEMPERATURE-TIME HISTORY OF A SOLID CYLINDER IMMERSED IN AN OPEN FIRE,
by Albert C. Giere and Luciano Sedillo.
1 June 61, 40p. incl. illus.
(NAVWEPS rept. no. 7724) Unclassified report

DESCRIPTORS: (*Nuclear weapons, Simulation, *Cylindrical bodies, Vulnerability, Fires, Aircraft fires, Aviation fuels, Combustion, Temperature, Time, Heat transfer, Thermal conductivity, Fourier analysis, Theory, Mathematical prediction, Mathematical analysis.)

Consideration is being given toward finding a simple method to predict the vulnerability of nuclear weapons to fire. An analytical method is presented for predicting the temperature-time history of an effectively infinite solid cylinder immersed in a large, open, aircraft-fuel fire. Essentially, the method consists of the solution of the Fourier heat-conduction equation for two different modes of heat transfer to the surface of the cylinder, each expressed by a linear boundary condition at the surface. The period of heating from the time of fuel ignition until the time the cylinder reaches its maximum temperature is divided into two time intervals. For the first interval, a model based on a constant heat flux to the cylinder surface is used. For the second, a model based on a variable flux that is proportional to the temperature difference between the fire and the cylinder surface is used. Agreement between the theoretical and experimental temperatures for the interior of the cylinder is good for both models. (Author)

AD-263 621 Div. 10
(TIPSB/LH) OTS price $3.60

Wyle Labs., El Segundo, Calif.
EVALUATION TESTING OF PROPELLANT LOADING SYSTEM VALVE DESIGNATION H-62, KIELEY AND MUELLER, INC., 1-1/2 INCH, AIR OPERATED HELIUM VALVE. (ENG-25-066-59-67).
4 Aug 61, 31p. incl. illus. tables (Rept. no. 10953-1)
(Contract AF 04(647)398)
(BSD TR 61-11) Unclassified report

DESCRIPTORS: (*Valves, Gas valves, Pneumatic valves, Propellants, Pressure gages, Standards, Tests, Test methods, Effectiveness.)

One propellant loading system, air operated helium valve, designation H-62 was subjected to evaluation tests consisting of examination of product, proof cycle test, operational service test, and disassembly and inspection test. The specimen satisfactorily complied with the specification requirements, with some exceptions. (Author)

AD-263 637 Div. 10, 4
(TIPSM/EJH) OTS price $12.50

Texas Butadiene and Chemical Corp., Channelview.
DEVELOPMENT OF HIGH TEMPERATURE HYDROCARBON JET FUELS.
Rept. for 1 May 60-30 Apr 61 on Aviation Fuels,
by Benjamin W. Thomas. Aug 61, 162p. incl. illus. tables.
(Contract AF 33(616)6884, Proj. 3048; In cooperation with Burke Research Co., Pompano Beach, Florida.)
(ASD TR 61-139) Unclassified report

DESCRIPTORS: (*Jet engine fuels, *Aviation fuels, *Airplane engine oils, *Lubricants, *Hydrocarbons, Synthesis, Preparation, Production, High temperature research, Temperature, Stability, Decomposition, Physical properties, Viscosity, Combustion, Costs.) (*Polycyclic compounds, Toluenes, Benzenes, Xylenes, Cumenes, Naphthalenes, Alkyl radicals, Ethylenes, Formaldehyde, Chemical reactions, Catalysis, Hydrogenation, Tests.) (Preparation, Fractionation, Hydrogenation, Alkyl radicals.)

Effort is reported to synthesize and evaluate some 50 to 100 hydrocarbon samples as potential high-temperature fuels for high-speed jet planes. Preparation involved alkylation, distillation, hydrogenation, and final rerun. Alkylating agents containing an ethylene linkage were alkylated with a variety of aromatics. In some cases, alkylating agents such as the aldehydes or diolefin hydrocarbons were used to link two aromatic molecules. Resultant fuels contained two cyclohexyl rings in each molecule. In addition, 38 alkylation reactions only were made for yield studies. (Author)

AD-263 672 Div. 10, 26
(TIPSM/EJH) OTS price $1.10

Science and Tech. Section, Air Information Div., Washington, D. C.
DESULFURIZATION OF SECOND BAKU STRAIGHT-RUN KEROSENES BY OZONIZATION.
11 Sep 61, 3p. incl. table (AID rept. 61-127; Trans. of Desulfurization of Straight-Run Kerosene Distillate by the Ozonization-Adsorption Method. Izvestiya Vysshikh Uchebnykh Zavedeniy. Neft' i Gaz 6:81-87, 1961 and Desulfurization of Ligroin and Kerosene Fractions of the Devonian-Crude Distillate from the Romashkino Oilfield Using Ozone. Izvestiya Vysshikh Uchebnykh Zavedeniy. Neft' i Gaz 4:91-98, 1960)
Unclassified report

DESCRIPTORS: (*Jet engine fuels, *Aviation fuels, Fuels, *Kerosene, Purification, Processing, Fractionation, Chemical impurities, Oxidation, *Ozone, Sulfur compounds, Separation, Adsorption.) (USSR, Translations, Technological intelligence.)

An article is presented which indicates the continuous effort of Soviet scientists to apply ozonization to the refining of liquid fuels, particularly those fuels orginating from sulfur-rich Second Baku crudes which could be used as jet fuels after satisfactory treatment. (Author)

AD-263 769 Div. 10, 30, 4
(TIPSM/REB) OTS price $1.60

Naval Research Lab., Washington, D. C.
THE SEPARATION OF WATER FROM FUELS. PART I. DEVELOPMENT OF LABORATORY EVALUATION METHOD, by J. A. Krynitsky and W. D. Garrett.
22 Aug 61, 15p. incl. illus. tables (NRL rept. no. 5685)
Unclassified report

DESCRIPTORS: (Fuels, *Aviation fuels, Jet engine fuels, *Fuel additives, Impurities, Water, *Separation, Test methods, Test equipment, Laboratory equipment, Design.)

A laboratory method and apparatus were developed for the evaluation of the water separation properties of fuels and fuel-additive combinations. The instrument, known as the Water Separometer, produces a water-in-oil emulsion mechanically, meters this emulsion through a cell containing standardized fiberglass coalescer disks, and analyzes the effluent for entrained water by light transmission. The relative ease of water removal from a given fuel is rated by averaging light transmission values obtained during a series of scheduled flow rates. This rating is known as the Water Separation Index (WSI). Variables affecting the performance of the method which have been studied include: coalescer media, water-to-fuel ratio, operating pressure, temperature, and cleanup procedure. Cooperative studies with other laboratories have shown the method to be satisfactory with respect to both repeatability and reproducibility. Comparison of data indicated that a good correlation exists between the developed laboratory method and the larger systems. (Author)

11. GROUND TRANSPORTATION EQUIPMENT

AD-263 687 Div. 11
(TIPSB/LH) OTS price $1.10

Army Armor Board, Fort Knox, Ky.
CHECK TEST OF COVER, MAINTENANCE, FRAME SUPPORTED TRACKED AND WHEELED VEHICLES, T61-9.
2 Oct 61, 9p. incl. illus. (Proj. no. 1970-1)
Unclassified report

DESCRIPTORS: *Vehicles, *Tracked vehicles, Climatic factors, Construction, *Maintenance, Tests, Reliability, Military requirements.

The test item is the Cover, Maintenance, Frame Supported, Tracked and Wheeled Vehicles, T61-9, designed to correct faults disclosed in test of the T59-8 maintenance cover and frame assembly. It consists of the following components: cover carrying cover; cotton duck cover; frame cover; frame assembly to support the cover; and wood and metal pins for guying the cover in various types of soil. The frame assembly consists of 2 telescopic magnesium tubing A-frame and 1 telescopic magnesium tubing ridgepole. The frame was designed to permit adjustment in width and height from 5-1/2 to 10 feet. US Army Armor Board concludes that modifications to correct previously reported deficiencies and shortcomings are satisfactory. (Author)

AD-263 688 Div. 11
(TIPSB/LH) OTS price $1.60

Army Armor Board, Fort Knox, Ky.
CONFIRMATORY TEST OF UNIT RIG MODEL DITCHING MACHINE, HIGH SPEED, WHEEL MOUNTED.
29 Sep 61, 7p. illus. (Proj. no. 2139)
Unclassified report

DESCRIPTORS: Tractors, *Fork lift vehicles, *Ditch digging equipment, Earth moving equipment, Graders, Military requirements, Test methods, Tests.

Division 12 - GUIDED MISSILES

12. GUIDED MISSILES

AD-263 175 Div. 12
(TIPSE/NTM) OTS price $2.60

Illinois U., Urbana.
ANALYSIS OF MISSILE LAUNCHERS. PART N PHASE 1 (STEADY STATE RESPONSE OF BAR TYPE STRUCTURES). Technical rept. no. 187 on Dynamics of Missile Launchers,
by M. Stippes, Mar 61, 16p. incl. illus. (T and AM rept. no. 187)
(Contract DA 11-070-508-ORD-593, Proj. 517-01-002)
Unclassified report

DESCRIPTORS: (*Missile launchers, *Launching, *Structures, Shear stresses, Vibration, Damping, Dynamics, *Guided missile launchers.) (Green's function, Mathematical analysis.) (Moments, Load distribution, Torque, Beams, Cantilever beams.)

A systematic procedure is given for a calculation for the steady-state response of bar type structures under pulsating loads. Use is made of Green's functions of free-free beams under pulsating transverse load, moment, and torque. (Author)

AD-263 198 Div. 12
(TIPSE/NTM) OTS price $1.00

National Aeronautics and Space Administration, Washington, D. C.
THE USE OF DRAG MODULATION TO LIMIT THE RATE AT WHICH DECELERATION INCREASES DURING NONLIFTING ENTRY,
by Lionel L. Levy, Jr. Sep 61, 31p. incl. illus. (NASA technical note no. D-1037)
Unclassified report

Also available from NASA, Wash. 25, D. C., as NASA Technical note no. D-1037.

DESCRIPTORS: (Aerodynamics, Satellite vehicles, *Deceleration, *Atmosphere entry, Motion, Aerodynamic heating, Range, Re-entry vehicles, Manned, Velocity, *Re-entry aerodynamics, Satellite vehicle trajectories.) (Drag, Modulation, Mathematical analysis.)

The method developed in NASA TN D-319 for studying the atmosphere entry of vehicles with varying aerodynamic forces has been applied to obtain a closed-form solution for the motion, heating, range, and variation of the vehicle parameter for nonlifting entries during which the rate of increase of deceleration is limited. The solution is applicable to vehicles of arbitrary weight, size, and shape, and to arbitrary atmospheres. Results have been obtained for entries into the earth's atmosphere at escape velocity during which the maximum deceleration and the rate at which deceleration increases were limited. A comparison of these results with those of NASA TN D-319, in which only the maximum deceleration limited, indicates that for a given corridor depth, limiting the rate of increase of deceleration and the maximum deceleration requires an increase in the magnitude of the change in vehicle parameter and results in increases in maximum heating rate, total heat absorbed at the stagnation point, and range. (Author)

AD-263 199 Div. 12, 17
(TIPSE/VB) OTS price $0.75

National Aeronautics and Space Administration, Washington, D. C.
PRELIMINARY INVESTIGATION OF IMPACT ON MULTIPLE-SHEET STRUCTURES AND AN EVALUATION OF THE METEOROID HAZARD TO SPACE VEHICLES,
by C. Robert Nysmith and James L. Summers. Sep 61, 27p. incl. illus. table, 17 refs. (NASA technical note no. D-1039)
Unclassified report

Also available from NASA, Washington 25, D. C. as NASA technical note no. D-1039.

DESCRIPTORS: (*Space probes, *Lunar probes, Vulnerability, Hazards, Meteors.) (Resistance, Hypervelocity projectiles, Spheres, *Sheets, *Aluminum, Penetration, Effectiveness.) (Spheres, Heat resistant glass.)

Small pyrex glass spheres, representative of stoney meteoroids, were fired into 2024-T3 aluminum alclad multiple-sheet structures at velocities to 11,000 fps to evaluate the effectiveness of multisheet hull construction as a means of increasing the resistance of a spacecraft to meteoroid penetrations. The results of these tests indicate that increasing the number of sheets in a structure while keeping the total sheet thickness constant and increasing the spacing between sheets both tend to increase the penetration resistance of a structure of constant weight per unit area. In addition, filling the space between the sheets with a light filler material was found to substantially increase structure penetration resistance with a small increase in weight. An evaluation of the meteoroid hazard to space vehicles is presented in the form of an illustrative example for 2 specific lunar mission vehicles, a single-sheet, monocoque hull vehicle and a glass-wool filled, double-sheet hull vehicle. The evaluation is presented in terms of the best and the worst conditions that might be expected as determined from astronomical and satellite measurements, high-speed impact data, and hypothesized meteoroid structures and compositions. (Author)

AD-263 200 Div. 12
(TIPSE/NTM) OTS price $1.25

National Aeronautics and Space Administration, Washington, D. C.
PRELIMINARY SURVEY OF RETROGRADE VELOCITIES REQUIRED FOR INSERTION INTO LOW-ALTITUDE LUNAR ORBITS,
by Morris V. Jenkins and Robert E. Munford. Sep 61, 41p. incl. illus. tables (NASA Technical note no. D-1081)
Unclassified report

Also available from NASA, Wash. 25, D. C., as NASA Technical note no. D-1081.

DESCRIPTORS: (Velocity, *Fuel consumption, *Lunar probes, Orbital flight paths.) (Vector analysis, Mathematical analysis, Partial differential equations.) (Satellite vehicles, Satellite vehicle trajectories.)

Closed lunar orbits are envisaged in lunar mission programs. The study described herein was undertaken to obtain an appreciation of the relevant fuel consumption requirements. The retrograde impulses necessary for establishing the orbits were assumed to occur at the point of closest approach of the main earth-moon trajectory; this point, designated as the arrival position, was restricted to a lunar altitude of 5,000 nautical miles or less. The orientation of the arrival position vector relevant to any coplanar radius vector is not constrained, however, and similarly the scalar value of the arrival velocity is unrestrained. Since the arrival altitude is restricted to 5,000 nautical miles or less,

the perturbing accelerations of the earth and sun are sufficiently small that the vehicle and moon essentially comprise an isolated two-body system; this is discussed in the report. Retrograde velocities are determined for any required pericynthion position. If the pericynthion orientation requirement is relaxed then a smaller retrograde velocity is in some cases possible. A comparison between minimum retrograde velocities and retrograde velocities necessary for stipulated pericynthion positions is given. (Author)

AD-263 236 Div. 12
(TIPSP/TL) OTS price $3.60

Aerospace Corp., Los Angeles, Calif.
A VARIABLE-LIFT PROGRAM FOR SATELLITE RE-ENTRY,
by H. E. Wang and S. T. Chu. July 61, 31p.
illus. (Rept. no. TDR-594(1526-01)TN-1)
(Contract AF 04(647)594)
Unclassified report

DESCRIPTORS: (*Re-entry vehicles, Satellite vehicles, Hypervelocity vehicles, Lift, Drag, Design, Analysis, Load distribution.) (*Re-entry aerodynamics, *Oscillation, Aerodynamic heating, Heating, Gravity.) (Upper atmosphere, Satellite vehicle trajectory, Acceleration, Deceleration, Atmosphere entry, Velocity.)

The trajectories of a lifting body entering the earth's atmosphere at circular satellite speed can be classified into two groups according to whether the trajectory exhibits oscillations or not. An approximate analytic solution is obtained for one type of nonoscillatory trajectory. This trajectory, if plotted on an altitude-velocity diagram, falls in the region bounded by a constant-altitude flight and a least deceleration flight. The analysis takes into account the coupling of CL and CD which are continuously varied according to a specific program. Such a program results in lower peak deceleration load as compared to the case of constant CL and CD flight, but suffers higher aerodynamic heating rate at the stagnation point. Consequently, the program provides a compromise between heating and loading. It is also pointed out that the present lift program can be generalized into one which gives various degrees of compromise between heating and loading by varying one or more parameters. (Author)

AD-263 282 Div. 12, 19
(TIPSP/WLH) OTS price $1.00

National Aeronautics and Space Administration, Washington, D. C.
STUDY OF A SATELLITE ATTITUDE CONTROL SYSTEM USING INTEGRATING GYROS AS TORQUE SOURCES,
by John S. White and Q. Marion Hansen. Sep 61, 37p. incl. illus. tables (NASA Technical note D-1073)
Unclassified report

Also available from NASA, Wash. 25, D. C. as NASA Technical note D-1073.

DESCRIPTORS: *Satellite vehicles, *Control systems, *Gyroscopes, Torque, Satellite attitude, Mathematical analysis.

Some general design criteria are derived and applied to a specific example. The results of the analytical design are compared with those of an analog computer study and also with experimental results from a low-friction platform. The results show the steady-state and transient behavior of the system using single-degree-of-freedom integrating gyros was reasonably good. A major advantage of using gyros for torque sources is that the gyros also act to stabilize the vehicle directly, even in the absence of an external reference, so that when the target is occulted, an alternate reference is not required. (Author)

AD-263 410 Div. 12, 7
(TIPSP/GRW) OTS price $10.50

Aerospace Corp., Los Angeles, Calif.
APPLIED RESEARCH MANAGEMENT ABSTRACT BULLETIN. PART I. ABSTRACTS 1-1 THROUGH 1-228.
July 61, 137p. 228 refs. (Rept. no. TDR-930 (2701-01)TN-1, Part 1, no. 1)
(Contract AF 04(647)930)
Unclassified report

DESCRIPTORS: (*Space flight, *Power supplies, *Bibliography.) (Auxiliary power plants, Electric power production, Propulsion, Materials.)

A bibliography of 228 references from unclassified literature, with abstracts, is presented on the subject of Flight Vehicle Power. The period covered is from 1958 to date. (Author)

AD-263 426 Div. 12, 6, 25
(TIPSE/VB) OTS price $3.60

Motorola, Inc., Riverside, Calif.
PULSED LIGHT INVESTIGATION.
Interim engineering rept. no. 3, June-Aug 61, by Melvin H. Horman and William J. Nolan, Jr. Sep 61, 33p. incl. illus. (Rept. no. RLI-3854-3)
(Contract AF 33(616)7680)
Unclassified report

DESCRIPTORS: (*Light pulses, Light, Brightness, Sources, Light transmission.) (*Photoelectric target seekers, Optical tracking.) (*Guided missiles, Guidance.) (Sparks, Brightness, Measurement, Mineral oils, Electric discharges.)

Data are discussed which was obtained on oil discharges with two discharge chambers; the characteristics of the circuits used are noted. A new triggerable oil source combining the characteristics of the .003-microfarad capacitor and a tubular oil chamber was designed and is being fabricated. The fourth configuration of the multiple configuration source was tested and the measurements are detailed. Some of the factors affecting the spark characteristics, such as spectral distribution, spark breakdown, and capacitor design, are discussed. (Author)

AD-263 427 Div. 12, 10, 2
(TIPSP/GRW) OTS price $1.60

Marquardt Corp., Van Nuys, Calif.
TOXICO-METEOROLOGICAL FACTORS IN SELECTION OF ROCKET SITES,
by Harry Levin. 14 Sep 61, 16p. (Rept. no. FE-223-5)
(Contract AF 04(611)4304)
Unclassified report

DESCRIPTORS: (*Launching sites, Selection.) (*Rocket propellants, Handling, Toxicity, *Hazards.) (Micrometeorology, Wind, Wind direction indicators, Climatic factors, Evaporation.)

The toxicity of certain types of propellants can be a governing factor in determining exclusion radii for rocket static test and launch sites. A noncombusted or partially combusted spill of toxic propellant can constitute the most extensive and persistent hazard and can override other factors in determining exclusion radius. Increased reliability in determination of spill emission (evaporation) rate and increased use of micrometeorology are both needed before exclusion radii can be recommended on other than the most conservative basis. (Author)

AD-263 472 Div. 12
(TIPSE/RD) OTS price $10.10

Cleveland Pneumatic Industries, Inc., Grand Rapids, Mich.
LAUNCHING AND ALIGHTMENT SYSTEMS FOR AERO-SPACE VEHICLES.
Rept. for June 59-Jan 61,
by Nelson T. Levings, Jr. May 61, 110p. incl. illus. tables.
(Contract AF 33(616)6572, Proj. 1369)
(WADD TR 60-857) Unclassified report

DESCRIPTORS: (*Satellite vehicles, *Launching, *Landing, *Satellite rendezvous vehicles, Design, Manned, Orbital flight paths, *Spaceships.) (Landing, Shock, Impact shock, Vibration isolators, Landing impact.) (Moon, Landing, Surface properties.) (Landing aids, Landing gear, Landing mats.) (Materials, Radiation effects, Thermal radiation.) (Parachute descents, Balloons.) (Airframes, Structures, Stresses.) (Launching, Balloons.) (Satellite rendezvous vehicles, Spaceships, Re-entry vehicles, Attachment.)

The purpose of this study was to investigate and derive concepts for alightment, attachment, and departure of advanced, extremely high-altitude flight vehicles. The following report describes the investigatory work, problems encountered, methods by which concepts were selected, and results of preliminary design integrity testing as applicable to specifically selected concept models. Results indicate that valuable data have been derived on the relative efficiency of the various types of shock mitigation systems as originally conceived through the efforts of this project. The basic framework for an evaluation technique by which the shock mitigation systems can be rated as to energy-absorbing capability and efficiency with regard to percentage of total mass of the system, has been provided. Additionally, through precision application of the laws of similitude in developing models of the most promising concepts, evidence has been provided as to the value of utilizing dynamic scaling as an important adjunct to the analytical techniques for preliminary design. (Author)

AD-263 476 Div. 12, 20
(TIPSP/WLH) OTS price $8.10

Little, Arthur D., Inc., Cambridge, Mass.
PRINCIPLES FOR THE CALCULATION OF RADIATION DOSE RATES IN SPACE VEHICLES.
Technical report on Liquid Propellant Losses During Space Flight.
by Robley D. Evans. July 61, 90p. incl. illus. tables (Report no. 63270-05-01)
(Contract NAS5-664; In cooperation with Massachusetts Institute of Technology)
Unclassified report

DESCRIPTORS: (*Spaceships, Stainless steel, *Radiation effects, Protons, Electrons, Bremsstralung, Diffusion.) (Liquefied gases, Hydrogen, Oxygen, Liquid rocket propellants.) *Dose rate, Radiation damage.,

The analysis takes into account the angular distribution of the incident protons and electrons and the angular distribution of the electron bremsstrahlung. The distribution with depth in the propellant is determined for the dose rate due to protons, for the dose rate due to electron bremsstrahlung, and for the deposition of stopped protons. Whereas the dose rates for monoenergetic protons or electrons are maximum at the surface of the propellant, the deposition of protons has its minimum at the surface and increases linearly with depth up to the range of the protons. For the case of protons, the maximum surface dose rate depends primarily on the total number of protons striking the surface, and only slightly on their energy, so long as their energy is sufficient for them to clearly penetrate the surface medium. Illustrative calculations are carried out for the Freden and White spectrum of protons and for the Walt et al. spectrum of electrons incident on thin-walled stainless steel vehicles carrying liquid H2 or liquid O2. The numerical results for O2 would be closely similar to those for biological materials. (Author)

AD-263 522 Div. 12, 2
(TIPSP/GRW) OTS price $9.60

Research Studies Inst., Air U., Maxwell Air Force Base, Ala.
A SPACE BIBLIOGRAPHY THROUGH 1958,
by Raymond Estep. 1959, 109p. (Documentary research study no. AU 283-58-RSI)
Unclassified report

DESCRIPTORS: (Astronomy, *Satellite vehicle research, *Astrophysics, *Bibliography, Space flight, Rockets, Scientific research, Propulsion.)

Contents:
Astronomy
Bibliography
Biography and autobiography
Commands, installations, and organizations
Electronics, -- communications, control, and guidance
History
Manufacturing, -- materials and methods
Missiles, rockets, and rocket-powered aircraft
Orbits and trajectories
Propulsion, -- engines and propellants
Research and testing
Satellite vehicles
Space flight
Space law
Space medicine

AD-263 557 Div. 12, 22
(TIPSE/CDM) OTS price $4.60

General Dynamics/Convair, San Diego, Calif.
STUDY OF HIGH SPEED PROJECTILE IMPACTS, LOADS, AND MOTIONS AT WATER ENTRY.
Aug 61, 41p. incl. illus. (Rept. no. ZH-154)
(Contract NOw 60-0494-d)
Unclassified report

DESCRIPTORS: (*Guided missiles, Air to underwater, Model tests, *Water entry.) (Test equipment, Hypervelocity projectiles, Water tanks, Gun launched.) (Instrumentation, Accelerometers, Telemeter systems.) (Tests, Acceleration, Pressure, Motion, Velocity, Measurement.)

An experimental investigation was conducted on high-velocity water entry impacts of 60-degree total apex angle conical-nosed projectiles.

Salient results are: (1) Projectiles with 1-in. and 2-in. diameter bodies have been fired vertically into water at air Mach numbers ranging from 0.4 to 1.0 (vertical velocities from 395 to 1120 fps); (2) Specially-developed accelerometer and sub-miniature epoxy-potted FM telemetering instrumentation were employed within the projectile body for the measurement of axial accelerations during water impact; (3) Water impact acceleration-time histories were recorded successfully during five tests with velocities ranging from 396 to 838 fps and with the maximum axial accelerations varying from 1530 to 6000 g's. It has been shown that the impact acceleration measurements are in good approximate agreement with the Pierson immersing-wedge theory, but that the experimental measurements fall considerably lower than the Shiffman-Spencer theory; and (4) Water impact pressure measurements were obtained in the far field (1.2 feet from the point of impact) which, together with theory, permit extrapolation of the experimental data to higher velocities. (Author)

AD-263 562 Div. 12, 25
(TIPSE/CRJ) OTS price $3.60

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
THE STUDY OF ELECTROMAGNETIC TECHNIQUES FOR SPACE NAVIGATION.
Quarterly progress rept. no. 6, 16 May-15 Aug 61, by R. G. Franklin and D. L. Birx. 15 Aug 61, 26p. incl. illus. table (Rept. no. Q-A2415-6) (Contract AF 33(616)7244, Proj. 0(610-4277))
Unclassified report

DESCRIPTORS: (*Space navigation, Electromagnetism.) (Solar noise, Solar energy, Light transmission, Solar spectrum.) (Spectrographic data, Spectrographic analysis, Templates, Solar spectrum.) (Density sensitive indicators, Interferometers.) Electronic circuits, Doppler systems, Optical systems.

A number of refinements have been made in the spectrographic system following the discovery that experimental results showed discrepancies with those predicted theoretically. These changes involved the making of new templates and a reduction in the amplitude of motion of the vibrating slit. Better agreement was obtained following these changes. Velocity scans taken across the face of the sun show random variations of several hundred meters per second. These figures agree with results obtained by other observers using resolutions comparable to our slit width. Electronic integration, although effective in reducing the amplitude of these random fluctuations, results in a response so sluggish that data taking becomes a very tedious process. Suggestions for improving this noise situation involve changing the optics to permit utilization of the whole sun and possibly an increase in the vibration frequency of the slit. Measurements using the whole sun will be attempted as soon as a stable reference arc source is available. (Author)

AD-263 573 Div. 12, 2, 25
(TIPSP/WLH) OTS price $.50

National Aeronautics and Space Administration, Washington, D. C.
THE EFFECT OF SOLAR RADIATION PRESSURE ON THE MOTION OF AN ARTIFICIAL SATELLITE,
by Robert W. Bryant. Sep 61, 8p. (NASA Technical note D-1063)
Unclassified report

Also available from NASA, Washington 25, D. C. as NASA Technical note D-1063.

DESCRIPTORS: (*Satellite vehicles, Motion, Solar soils, Solar atmosphere, *Solar energy, Drag, Solar eclipse.) (Mathematical analysis, Vector analysis.) Satellite vehicle trajectories, Atmosphere.

The effects of solar radiation pressure on the motion of an artificial satellite are obtained, including the effects of the intermittent acceleration which results from the eclipsing of the satellite by the earth. Vectorial methods have been utilized to obtain the nonlinear equations describing the motion, and the method of Kryloff-Bogoliuboff has been applied in their solution. (Author)

AD-263 673 Div. 12, 25, 30
(TIPSP/MFA) OTS price $1.60

Science and Tech. Section, Air Information Div., Washington, D. C.
CELESTIAL MECHANICS AND OPTIMUM METHODS. PART 2. MOTION OF BODIES OF VARIABLE MASS (SURVEY OF SOVIET LITERATURE FOR 1956-1960).
31 Aug 61, 17p. (AID rept. 61-128)
Unclassified report

DESCRIPTORS: (*Rocket research, *Astronautics, *Celestial mechanics, Exterior ballistics, mechanics, Motion.) (Functions, Theory, Equations, Nonlinear systems.) (Differential equations, Partial differential equations, Integration, Tensor analysis, Perturbation theory, Bessel functions.) *Bibliography, Rocket motors, *Spaceships, USSR.

An introduction to the motion of bodies of variable mass is presented, and a literature survey of a collection of 19 Soviet papers for the years 1956-1960 is made.

AD-263 768 Div. 12, 25
(TIPSP/WH) OTS price $1.00

National Aeronautics and Space Administration, Washington, D. C.
A STUDY OF THE EFFECT OF ERRORS IN MEASUREMENT OF VELOCITY AND FLIGHT-PATH ANGLE ON THE GUIDANCE OF A SPACE VEHICLE APPROACHING THE EARTH,
by Jack A. White. Oct 61, 37p. incl. illus. (Technical note no. D-957)
Unclassified report

Also available from NASA, Wash. 25, D. C. as NASA Technical note D-957.

DESCRIPTORS: (*Hypervelocity vehicles, Orbital flight paths, *Atmosphere entry, Guidance.) (*Re-entry vehicles, Exterior ballistics, Retro rockets, Thrust.) (Spaceships, Satellite vehicle trajectories, Guided missile trajectories.) Velocity, Measurement.

A study was made to determine the effect of errors in measuring velocity and flight-path angle, in applying the corrective thrust, and in the initial predicted perigee altitude upon the guidance of a space vehicle to a desired perigee altitude. Corrective impulses were applied only when the vehicle's predicted perigee altitude was not within a deadband about the desired perigee altitude. The method of scheduling observation points along the trajectory was to make an observation (and to apply a correction if needed) each time the true anomaly increased a given amount. (Author)

Division 12 - GUIDED MISSILES

AD-263 789 Div. 12
(TIPSE/NTM) OTS price $1.10

Friez Instrument Div., Bendix Corp., Baltimore, Md.
DESIGN AND DEVELOPMENT OF A REMOTE SETTING MINIATURE BAROSWITCH AND SETTER FOR USE IN GUIDED MISSILE ADAPTION KITS.
Rept. no. 10, 1-30 June 61,
by L. C. Friend and K. D. Shaub. 30 June 61, 3p.
(Contract DA 36-034-ORD-3284, Proj. TN2-8106)
Unclassified report

DESCRIPTORS: (*Pressure switches, Barometric pressure, *Guided missile warheads, Remote control systems, Design, Tests, Sliding contacts, Electric switches, Guided missile fuzes, Diaphragms (Mechanics), Vibration, Miniature electrical equipment.) (Servomechanisms, Adapters.)

The research objective has been to evaluate performance of the preliminary baroswitch design. Vibration tests of single elements verify unbalance of contact counterweights; also show 1600 c resonance of arm supporting remote set contacts. Operation of baroswitch completely without lubrication appears to be feasible. Fixtures for vibration testing of a complete remotely settable element have been constructed and tests performed. The results of the element vibration test clearly indicate the presence of two resonant frequencies, at 1640 and 2650 c, which are excited by table harmonics at certain fractions of these frequencies. The 2650 c frequency is about what was expected for the diaphragm - contact configuration. The sensitivity of this assembly to low vibration inputs is indicative of poor mass-balance. This unbalance will be corrected by appropriate changes to the counterweights. (Author)

AD-263 790 Div. 12
(TIPSE/NTM) OTS price $1.10

Friez Instrument Div., Bendix Corp., Baltimore, Md.
DESIGN AND DEVELOPMENT OF A REMOTE SETTING MINIATURE BAROSWITCH AND SETTER FOR USE IN GUIDED MISSILE ADAPTION KITS.
Rept. no. 9, 1-31 May 61,
by L. C. Friend, and K. D. Shaub. 31 May 61, 7p. incl. illus.
(Contract DA 36-034-ORD-3284, Proj. TN 2-8106)
Unclassified report

DESCRIPTORS: (*Pressure switches, Barometric pressure, *Guided missile warheads, Remote control systems, Design, Tests, Sliding contacts, Electric switches, Guided missile fuzes, Diaphragms (Mechanics), Vibration, Miniature electrical equipment, Temperature.) (Servomechanisms, Adapters.)

The research objective has been to determine what design revisions will be necessary to ensure adequate performance of the miniature baroswitch and setter. Tests of the baroswitch assembly have verified that temperature and settability errors are acceptably small. Range of the first model has been extended to 50 mbs in lieu of fixed-set contacts. Reasonable compensation accuracy appears to be + or - 2 mbs over range -3 to 65,000 ft. Vibration troubles so far limit usable range of baroswitch assembly to frequencies below 700 cp. It may be necessary to revise mounting to support unit on plane through c. g. This would increase package dimensions. (Author)

AD-263 817 Div. 12, 15, 17, 22
(TIPSP/TL) OTS price $3.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
STUDY OF EQUATIONS GOVERNING THE VISCO-PLASTIC MODEL.
Quarterly rept. no. 2, 3 Feb-3 May 61,
by T. D. Riney. July 61, 31p. incl. illus. table.
(Contract AF 08(635)1713, Proj. 9860)
(APGC TN 61-30) Unclassified report

DESCRIPTORS: (*Hypervelocity vehicles, Spheres, *Bodies of revolution, *Cylindrical bodies, *Difference equations, Mathematical analysis, *Partial differential equations, *Differential equations.) (Materials, Aluminum, Aluminum alloys, Steel, Lead, Tungsten compounds, Carbides.) (Tests, Axially symmetric flow, *Plastic flow, *Fluid flow, Penetration, Viscosity, Deformation, Cratering, Mach number, Shock waves, Pressure, Stability, Impact shock.) Theory.

A hydrodynamical formulation which incorporates the effects of material viscosity and dynamic strength was proposed (AD-255 419) as a model for the study of hypervelocity impact. These effects were accounted for by introducing a viscosity coefficient mu and a dynamic yield strength tau. A great complication of the governing partial differential equations was unavoidable. The present analysis opens with an examination of the governing equations to determine the dimensionless parameters which control the relative importance of the inertial, viscous and strength terms. Both mu and tau appear in the dimensionless parameters. In the hypervelocity impact regime there is apparently no definitive data available for either parameter. Therefore we decided to investigate the importance of the various terms in a one-dimensional model in which the values of mu and tau are varied over several orders of magnitude. The governing equations as well as the initial and boundary conditions are formulated in finite difference form for the purpose of making these exploratory calculations. (Author)

AD-263 821 Div. 12, 2
(TIPSB/MS) OTS price $4.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
EFFECTS OF MICROMETEORITES ON SPACE VEHICLES. AN ANNOTATED BIBLIOGRAPHY.
Addendum to the Space Materials Handbook,
comp. by J. B. Goldmann and W. L. Hollister.
July 61, 46p. 116 refs. (Rept. no. 3-34-61-5; Special bibliography no. SB-61-37)
(Contract AF 04(647)673)
Unclassified report

DESCRIPTORS: (*Meteorites, *Spaceships, *Satellites, *Satellite vehicles, *Bibliography.)

The references included in this publication were gathered to present information on the effects of cosmic dust, micrometeorites, and meteorites on space vehicles. The erosive effects of micrometeorites and cosmic dust are included. Also included are the penetration effects of meteorites. Information on the effects of erosion and penetration on thermal contract surfaces, effects on structures and effects on optical devices were included. Theoretical and experimental research on erosion and penetration were also included. References are arranged alphabetically by author. (Author)

AD-263 860 Div. 12
(TIPSE/NTM) OTS price $2.60

AVCO Research Lab., Everett, Mass.
RE-ENTRY OF ROTATING MISSILES,
by Conrad L. Longmire. Dec 60, 23p. incl. illus. (Research note no. 213)
(Contract AF 04(647)278; Subcontract to Bell Telephone Labs., Inc., Whippany, N. J., Contract DA 30-069-ORD-1955)
(AFBMD TR 61-10) Unclassified report

DESCRIPTORS: (*Re-entry vehicles, Atmosphere entry, *Re-entry aerodynamics, *Rotation, Oscillation.) (Mathematical analysis, Differential equations, Bessel functions.)

Re-entry of a rotating symmetrical missile, which is assumed to move along a straight path, is examined. The equations of rotational motion are reduced to one second order differential equation for the angle-of-attack, the other angles being then obtainable as quadratures. This form of the equations of motion is suitable for numerical integration, as all of the exact constants of motion have already been integrated out. Small angle oscillations are considered, and it is shown that previous analyses of the effect of rotation on oscillation are in error, due to an improper procedure for obtaining the small-angle equations. It is pointed out that the precession rate of the oscillational motion is likely to depend as much on non-linearities in the aerodynamic restoring torque as on the rotational velocities. For a rotating missile with large initial angle-of-attack, the adiabatic invariant is used to calculate the amplitude of oscillation at the lower altitudes. (Author)

AD-263 892 Div. 12
(TIPSE/NTM) OTS price $4.60

Illinois U., Urbana.
ANALYSIS OF MISSILE LAUNCHERS. PART O PHASE I (MULTI-DEGREE OF FREEDOM MODELS),
by G. A. Wempner and S. K. Lee. Aug 61, 47p. incl. illus. (T and AM rept. no. 195)
(Contract DA 11-070-508-ORD-593, Proj. TU2-7D (TW-205))
Unclassified report

Original contains color plates: All ASTIA reproductions will be in black and white. Original may be seen in ASTIA Hq.

DESCRIPTORS: (*Guided missiles, Launchers, Design.) (Guided missiles, Launching, Pitch, Yaw, Motion, Thrust, Stability.) (Launching, Differential equations, Mathematical analysis.)

Continued research is reported on guided missile launchers. The analysis of the straight rail launcher model has been revised to include the effects of a slight initial curvature of the rail and the influence of thrust malalignment. (Author)

13. INSTALLATIONS AND CONSTRUCTION

AD-263 378 Div. 13, 4
(TIPSB/MS) OTS price $2.60

Callery Chemical Co., Pa.
DESIGN OF SAFETY EQUIPMENT FOR HANDLING HIGH-ENERGY RESEARCH MATERIALS OF UNKNOWN SENSITIVITY,
by J. P. Cherenko. 4 Aug 61, 24p. incl. illus. tables.
Unclassified report

DESCRIPTORS: (*Remote control systems, Test equipment, *Safety devices, Protective coverings, Design, Construction, Tests.) (*Chemical engineering, Industrial equipment, Handling, Explosives, Tetryl.) (Personnel, Safety.)

The design of systems for protection of personnel while preparing, transporting and testing high-energy research materials of unknown sensitivity is discussed in this report. Facilities for preparing and handling such materials have been built at the Callery Research and Development Laboratories. The equipment and constructions have been tested with explosions of tetryl, of approximately 50 percent greater weight than the maximum of the experimental material to be handled. In the construction, personnel safety was the prime consideration and equipment protection was of secondary concern. (Author)

AD-263 467 Div. 13
(TIPSB/CDW) OTS price $1.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
A FENESTRAL SPRINKLER SYSTEM TO PREVENT FIRES CAUSED BY THERMAL RADIATION,
by J. C. King. 14 Sep 61, 15p. incl. illus. (Technical rept. no. 165)
Unclassified report

DESCRIPTORS: *Sprinklers, Design, Thermal radiation, Fires, Control, Automatic, Buildings.

A fenestral sprinkler system has been designed for the interior of buildings to extinguish fires which can result from the entrance through windows of thermal radiation from a nuclear bomb. The system is wet and has its own water supply which activates automatically when the external water-main supply is inadequate. An additive solution is fed into the system regardless of water source and enhances the extinguishing properties of plain water. The piping system is similar to that of ordinary fire protection systems, portions of which could be used with minor modifications. A normally closed solenoid valve in the branch-room lines is operated by a flame detector and permits the use of open heads. The system is self-deactivating but remains armed after all solenoid valves close following extinguishment. Only rooms subject to thermal radiation need protection. The fenestral sprinkler system is recommended for test. (Author)

AD-263 554 Div. 13
(TIPSB/CDW) OTS price $1.60

General Dynamics/Convair, San Diego, Calif.
CONVEYOR SYSTEM PROPOSAL.
Sep 61, 9p. incl. illus. (Rept. no. ZP-347)
(Sponsored by Army Quartermaster Research and Engineering Command)
Unclassified report

DESCRIPTORS: *Conveyors, Roller bearings, Couplings, Design, Military requirements.

A complete investigation of the existing conveyor system design was made by General Dynamics/Convair. This investigation was an over-all

design evaluation and included: (1) Ease of Production; (2) Preliminary Stress Analysis; (3) Manufacturing Methods; (4) Producibility; (5) Maintainability; (6) Reliability; (7) Simplification; (8) Standardization; and (9) Weight Analysis. Some of the results of this evaulation are shown in the drawing and are discussed in this proposal. (Author)

AD-263 586 Div. 13
(TIPSE/RD) OTS price $1.60

Rome Air Development Center, Griffiss Air Force Base, N. Y.
AIR CONDITIONER SET AF/F-32C-4,
by John J. Gubs. Sep 61, 12p. incl. illus. tables (RADC TR 61-188)
Unclassified report

DESCRIPTORS: (*Air conditioning equipment, Design, Tests, Maintenance, Mobile.) (Biological warfare, Chemical warfare.) (Radio receivers, Control systems.) (Air, Radiological contamination, Biological warfare agents, Chemical warfare agents.)

A general description and the results are presented of an effort to produce a compact 12,000 Btu/hr air conditioning unit, with a built-in collective protector unit, for filtering contaminated air during radiological, biological, or chemical attack. The unit was designed for use with Project Two Wheels equipments and is considered worthy of consideration for use in other mobile military systems. A description and results of numerous performance tests conducted on the unit are included. (Author)

14. MATERIALS (NON-METALLIC)

AD-263 184 Div. 14
(TIPSB/LH) OTS price $4.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
PLYWOOD, AND ITS APPLICATION TO THE AIRCRAFT INDUSTRY, 1918-1953: A SELECTED BIBLIOGRAPHY,
comp. by Jack B. Goldmann. July 61, 44p.
(Special bibliography no. SB-61-41; 3-80-61-8)
(Contract NOrd-17017)
Unclassified report

DESCRIPTORS: *Bibliography, *Plywood, Aircraft industry.

This annotated bibliography covers publications released between the end of the first World War (1918) and the conclusion of the Korean War (1953). Emphasis has been placed upon printed matter pertaining to the properties, fabrication and uses of plywood, as well as two wood species, Sitka spruce and Douglas fir. All references to publications of the Forest Products Laboratory, Madison, Wisc., have been omitted. (Author)

AD-263 189 Div. 14
(TIPSM/BRW) OTS price $1.60

Narmco Industries, Inc., San Diego, Calif.
POTENTIAL OF FILAMENT WOUND COMPOSITES.
Monthly progress rept. no. 6, 1-31 Aug 61,
by C. Y. Chia, B. Duft and others. Aug 61, 18p. incl. illus.
(Contract NOw 61-0623-c)
Unclassified report

DESCRIPTORS: (*Beams, *Filament wound construction, Reinforcing materials, Glass textiles, Plastics, Laminates, Resins, Epoxy resins, Phenolic resins.) (*Beams, Deflection, Deformation, Moments, Load distribution, Shear stresses, Stresses, Theory, Mathematical analysis, Equations.) Fibers, Glass, Tensile properties, Coatings, Humidity, Amines, Silanes.

Theoretical relations were derived for stresses and deflections of composite beam with all fibers oriented parallel and in orthogonal directions separately. These are based on assumptions similar to those used in homogeneous beam theory. These theoretical relations will be checked experimentally. Comparison will also be made between the theoretical relations developed in this report and theoretical relations available in the references cited. (Author)

AD-263 192 Div. 14
(TIPSB/CDW) OTS price $1.10

Aeronautical Materials Lab., Naval Air Material Center, Philadelphia, Pa.
QUALIFICATION TEST RESULTS ON CHANDLER EVANS CORPORATION DEHYDRATOR PLUG, CECO P/N 74700, PROTEK PLUG,
by D. Minuti. 17 May 61, 10p. incl. tables (Rept. no. NAMC-AML 1245)
Unclassified report

DESCRIPTORS: *Dehydrators, *Dessicants, Humidity, Moisture, Absorption, Tests.

Based on the results of an evaluation as well as the comments received from the various Air Stations, it was concluded: (1) The Chandler Evans Corporation dehydrator plug, designated as Ceco P.N 74700, Protek Plug, is satisfactory for field use; and (2) Specification MIL-P-6131 and drawing AN 4062 should be revised to permit acceptance of the Chandler Evans Corporation dehydrator plug. (Author)

AD-263 232 Div. 14, 26, 27
(TIPSM/SEB) OTS price $2.60

Rocketdyne, Canoga Park, Calif.
PREIMPREGNATED ROVING STUDY.
Monthly progress rept. no. 5, 31 July-31 Aug 61. 8 Sep 61, 5p. illus. (Rept. no. 61RC13470)
(Contract NOw 61-0498-c)
Unclassified report

DESCRIPTORS: (*Rocket cases, Propellant tanks, *Filament wound construction, Processing.) (*Fibers, Synthetic fibers, Resins, *Epoxy resins, Impregnation, Storage, Mechanical properties, Tensile properties, Determination, Test methods, Test equipment, Tests.) (*Cylindrical bodies, Processing, Wire-winding machines.) (Pressure, Hydrostatic pressure, Tests.)

The effects of multiple pulley feed systems and mechanical brakes on the properties of preimpregnated roving during winding operations were given a preliminary evaluation. The effects of resin content, resin aging and theoretical glass content on the strand tensile strength of preimpregnated roving are being studied. Procedures are

being developed for the preparation of a digital control tape for wrapping an 18-in. diameter x 24 in. long tank with preimpregnated roving by means of numerical control. Studies on various lots of preimpregnated roving stored at refrigerator and deep freeze temperatures, respectively, are being continued. A series of evaluations on the combined effects of winding tension and resin content on the hoop tensile strength of 3-inch id test cylinders were made. Most of the test cylinders failed in a normal manner under hydrostatic burst testing. However, cylinders with a low resin content had a tendency to fail at an average lower stress. (Author)

AD-263 292 Div. 14
(TIPSM/EET) OTS price $1.10

Aeronautical Materials Lab., Naval Air Material Center, Philadelphia, Pa.
RESULTS OF QUALIFICATION TESTS ON THREE TYPE I, MIL-A-5090D ADHESIVES, SUBMITTED BY MINNESOTA MINING AND MANUFACTURING COMPANY,
by I. Rosenfeld. 11 Jan 61, 5p. incl. tables.
(Rept. no. NAMC-AML-1189)
Unclassified report

DESCRIPTORS: (*Adhesives, Metals, Bonding, Heat-resistant polymers, Military requirements, Specifications, Tests.) (Airframes, Structures.)

The results of tests on AF-6030 (liquid and film - two part), AF-6032 (liquid and film - two part), and AS-8233 (liquid - three part) indicate that the 3 adhesives fulfill the requirements of Military Specification MIL-A-5090D for all tests performed prior to storage. (Author)

AD-263 293 Div. 14
(TIPSM/EET) OTS price $1.10

Aeronautical Materials Lab., Naval Air Material Center, Philadelphia, Pa.
MIL-G-27343(USAF) QUALIFICATION TEST RESULTS ON SHELL OIL COMPANY GREASE (SG-1022) AEROSHELL 15 (ETR GREASE H)
by W. G. Brown. 13 Jan 61, 3p. incl. table.
(Rept. no. NAMC-AML-1190)
Unclassified report

DESCRIPTORS: (*Greases, Lubricants, Military requirements, Specifications, Tests.)

The results of tests on Shell Oil Company Grease (SG-1022) indicate the material is in conformance with the requirements of Specification MIL-G-27343. (Author)

AD-263 294 Div. 14
(TIPSM/EET) OTS price $1.10

Aeronautical Materials Lab., Naval Air Material Center, Philadelphia, Pa.
QUALIFICATION TEST OF REEVES BROTHERS, INCORPORATED, LAMINATED CLOTH AND TAPE OF NATURAL RUBBER ON COTTON FOR PNEUMATIC FLOTATION EQUIPMENT,
by W. T. Kelly. 13 Jan 61, 7p. incl. tables.
(Rept. no. NAMC-AML-1191)
Unclassified report

DESCRIPTORS: (*Adhesive tapes, Cotton textiles, Rubber coatings, Military requirements, Specifications, Tests.) (Life preservers, Life rafts.)

The requirements of Specification MIL-C-6819C and the applicable base cloth Specification MIL-C-6820C were met by (1) variety N, Reeves style 5184, samples P. O. 558-1 and P. O. 642-2; (2) variety O, Reeves style 5188, samples P. O. 593-1 and P. O. 528-4C; (3) variety R, Reeves style 5569; (4) base cloths, class 1 and 2 of MIL-C-6820; (5) coating slabs, compounds 4639 yellow, 4603 yellow, 4663 black, and 4619 blue; and (6) coating adhesion specimens. (Author)

AD-263 295 Div. 14
(TIPSM/EET) OTS price $1.10

Aeronautical Materials Lab., Naval Air Material Center, Philadelphia, Pa.
SPECIFICATION MIL-T-22085(WEP) AMEND-1 QUALIFICATION TEST RESULTS ON PERMACEL TAPE CORPORATION'S TAPE #D6884,
by H. G. Pfleiderer. 1 Feb 61, 3p. incl. table.
(Rept. no. NAMC-AML-1199)
Unclassified report

DESCRIPTORS: (*Adhesive tapes, Military requirements, Specifications, Tests.)

The results of tests on Permacel Tape Corporation's Tape #D6884 indicate that the tape is in conformance with the requirements of MIL-T-22085(WEP) Amend-1. (Author)

AD-263 296 Div. 14
(TIPSM/EET) OTS price $1.10

Aeronautical Materials Lab., Naval Air Material Center, Philadelphia, Pa.
SPECIFICATION MIL-G-7118A QUALIFICATION TEST RESULTS OF SOCONY MOBIL OIL COMPANY MOBILGREASE 27 (XTR-33),
by W. G. Brown. 30 Mar 61, 4p. incl. table.
(Rept. no. NAMC-AML-1222)
Unclassified report

DESCRIPTORS: (*Greases, Lubricants, Military requirements, Specifications, Tests.)

Based on the results of tests, it is concluded that Mobilgrease 27 (XTR-33) meets the requirements of Specification MIL-G-7118A. (Author)

AD-263 297 Div. 14
(TIPSM/BRW) OTS price $1.10

Aeronautical Materials Lab., Naval Air Material Center, Philadelphia, Pa.
QUALIFICATION TEST OF TECHNICAL RUBBER, INC., VARIETY S RUBBER COATED NYLON CLOTH,
by W. T. Kelly. 30 Mar 61, 4p. incl. tables.
(Rept. no. NAMC-AML-1226)
Unclassified report

DESCRIPTORS: *Nylon, Synthetic fibers, Textiles, *Rubber coatings, Military requirements, Specifications, Tests.

The test results show that samples, identified as Variety S, Technical Rubber Specification 2075A, and Base Cloth, Frank IX, New York, N. Y., Style No. 22 met the requirements of Specification MIL-C-7966A and applicable portions of the base cloth Specification MIL-C-7020D. (Author)

Division 14 - MATERIALS (NON-METALLIC)

AD-263 300 Div. 14
(TIPSM/BRW) OTS price $1.10

Aeronautical Materials, Lab., Naval Air Material Center, Philadelphia, Pa.
SPECIFICATION MIL-L-4343A, QUALIFICATION TEST RESULTS ON GENERAL ELECTRIC COMPANY GREASE SS-4046,
by W. G. Brown, 11 May 61, 3p. incl. table (Rept. no. NAMC-AML-1243)

Unclassified report

DESCRIPTORS: (Lubricants, *Greases, Military requirements, Specifications, Tests.) (Greases, Materials, Lithium compounds, Stearates, Silicones.)

Based on the results of tests, it was concluded that grease SS-4046 meets the requirements of Specification MIL-L-4343A (USAF). (Author)

AD-263 302 Div. 14
(TIPSM/BRW) OTS price $1.10

Aeronautical Materials Lab., Naval Air Material Center, Philadelphia, Pa.
MIL-L-22273(WEP) QUALIFICATION TEST RESULTS ON ACHESON COLLOIDS COMPANY DAG 253,
by H. G. Mowery. 24 May 61, 3p. incl. table. (Rept. no. NAMC-AML-1259)

Unclassified report

DESCRIPTORS: (*Lubricants, Solids, Films, Military requirements, Specifications, Tests.) (Lubricants, Materials, Molybdenum compounds, Sulfides, Graphite, Phenolic resins, Toluenes, Cellulose acetates, Butanols.)

Based on the results of tests, it was concluded that DAG 253 meets the requirements of MIL-L-22273(WEP). (Author)

AD-263 303 Div. 14
(TIPSM/BRW) OTS price $1.10

Aeronautical Materials Lab., Naval Air Material Center, Philadelphia, Pa.
RESULTS OF QUALIFICATION TESTS ON A-HT7-S TYPE II MIL-A-8623A ADHESIVE SUBMITTED BY THE BORDEN CHEMICAL COMPANY,
by I. Rosenfeld and E. K. Rishel. 20 Oct 60, 3p. incl. table (Rept. no. NAMC-AML-22055-60, pt. 1)

Unclassified report

DESCRIPTORS: (*Adhesives, Resin adhesives, *Epoxy resins, Metals, Bonding, Military requirements, Specifications, Tests.)

AD-263 304 Div. 14
(TIPSM/BRW) OTS price $1.10

Aeronautical Materials Lab., Naval Air Material Center, Philadelphia, Pa.
QUALIFICATION TEST REPORT ON MINNESOTA MINING AND MANUFACTURING COMPANY'S EC2126 ADHESIVE TESTED IN ACCORDANCE WITH MILITARY SPECIFICATION MIL-A-5092 (AER) ADHESIVE, RUBBER (SYNTHETIC AND RECLAIMED RUBBER BASE) OF 27 AUGUST 1952.
9 Feb 61, 3p. (Rept. no. NAMC-AML-22079-60)

Unclassified report

DESCRIPTORS: *Adhesives, *Rubber adhesives, Military requirements, Specifications, Tests, Adhesion.

Test data indicate that the EC2126 adhesive conforms with all the qualification requirements of Military Specification MIL-A-5092A (Aer), Type III. (Author)

AD-263 306 Div. 14
(TIPSM/BRW) OTS price $1.10

Aeronautical Materials Lab., Naval Air Material Center, Philadelphia, Pa.
QUALIFICATION TEST REPORT ON DODGE CORK COMPANY'S 711-BN AND 100-N GASKET MATERIALS TESTED IN ACCORDANCE WITH MIL-G-6183, AMENDMENT-4, GASKETS AND SHEET GASKET MATERIAL; SYNTHETIC RUBBER AND CORK COMPOSITION. CLASS I. FIRM; AND CLASS II. MEDIUM, RESPECTIVELY OF 22 AUGUST 1947,
by E. J. Colacicco. 8 Dec 60, 3p. (Rept. no. NAMC-AML-22090-61)

Unclassified report

DESCRIPTORS: (*Gaskets, Sheets, Seals, Military requirements, Specifications, Tests.) (*Cork gaskets, Gaskets, Materials, Synthetic rubber.)

Test data indicated that Dodge Cork Company's sheet gasket materials 711-BN and 100-N conform with all the qualification requirements of Military Specification MIL-G-6183, Amendment-4, Class I, Firm; and Class II, Medium, respectively. (Author)

AD-263 308 Div. 14
(TIPSM/BRW) OTS price $1.10

Aeronautical Materials Lab., Naval Air Material Center, Philadelphia, Pa.
MIL-G-25760, QUALIFICATION TEST RESULTS ON SHELL OIL COMPANY SAMPLE SHELLAIR WTR GREASE (SG-1057),
by W. G. Brown. 7 Sep 60, 3p. incl. table (Rept. no. NAMC-AML-RRMA-4004, pt. 75)

Unclassified report

DESCRIPTORS: Lubricants, *Greases, Military requirements, Specifications, Tests.

Based on the results of tests, it was concluded that Shellair WTR Grease (SG-1057) meets the requirements of specification MIL-G-25760. (Author)

AD-263 309 Div. 14, 26
(TIPSE/DLW) OTS price $.75

Watertown Arsenal Labs., Mass.
DRYING CERAMICS IN ULTRAHIGH-FREQUENCY ELECTRICAL FIELDS.
Rept. on Ceramic Gages for Inspection,
by Robert S. Feigelson. July 61, 28p. incl. illus. tables (Rept. no. WAL TR 671.1/1)

Unclassified report

DESCRIPTORS: (*Ceramic materials, Ceramic coatings, *Hardening, Drying ovens, Dielectrics, Processing, *Manufacturing methods.) Ultra high frequency, *Electric fields, Heat treatment, Efficiency, Tests.

The program undertaken was designed to determine the applicability of dielectric heating to the drying of ceramic components fabricated by wet processing techniques. The general characteristics of dielectric drying were studied along with the specific moisture removal characteristics for a typical wet-processed ceramic composition (50% clay, 25% flint, 25% feldspar). The results obtained in this investigation showed that rapid drying rates for ceramics are possible with the dielectric heating method. Wet ceramic components can be heated and dried uniformly in the electric

field without the development of severe temperature and moisture gradients which might lead to cracking and/or warping of the components. Although drying rates were found to be extremely high, they are limited by the rupture strength of the material, i.e., its ability to withstand the stresses developed by the pressure of the escaping water vapor. Dielectric drying holds interesting possibilities for drying high-cost ceramic components or component systems which are difficult to process by other techniques. (Author)

AD-263 604 Div. 14
(TIPSM/BRW) OTS price $6.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
PYROLYTIC GRAPHITE: AN ANNOTATED BIBLIOGRAPHY, comp. by A. A. Beltran. July 61, 64p. (Special bibliography no. SB-61-44; Rept. no. 3-80-61-13)
(Contract NOrd-17017)

Unclassified report

DESCRIPTORS: *Bibliography, *Graphite, Graphite compounds, Carbides, Hydrocarbons, Pyrolysis, Carbon deposits, Production, Refractory coatings, Fuel injectors, Guided missile noses, Control surfaces, Rocket motor nozzles, Resistors, Physical properties, Mechanical properties, Electrical properties, Manufacturing methods, Quality control, Nondestructive testing, Electron microscopy, Microscopy, X-ray diffraction analysis, Ultrasonics, Magnetic materials.

Literature concerned with the production, properties and nondestructive testing of pyrolytic graphite, pyrocarbide, pyrofiber, pyrographalloys, and high density graphite is covered in this bibliography. Uses of these materials as coatings and free standing components; fabrication methods and equipment; quality control; and test procedures are included. The abstracts are arranged alphabetically by author, however, this method splits a series of reports by different authors and the reports of a specific company. This difficulty is overcome by the source-report number index which is an alphabetical listing of the companies issuing the reports. The report numbers, together with the ASTIA number, are listed in alphabetical-numerical sequence under the issuing company. (Author)

AD-263 661 Div. 14
(TIPSM/BRW) OTS price $1.10

General Electric Co., Evendale, Ohio.
HIGH STRENGTH GLASS FIBERS DEVELOPMENT PROGRAM.
Monthly progress rept. no. 2, 15 Aug-15 Sep 61, by D. L. Hollinger and H. T. Plant. 25 Sep 61, 7p.
(Contract NOw 61-0641-c)

Unclassified report

DESCRIPTORS: *Glass textiles, Glass, Fibers, Production, Manufacturing methods, Automation, Melting, Drawing (Machine processing), Plastic coatings, Drying ovens, Controlled atmospheres, Water vapor, Corrosion, Tensile properties, Measurement, Mechanical properties.

Effort was directed toward the design and construction of equipment and facilities for the drawing of a single glass monofilament from molten glass produced in an electrically heated furnace. The monofilament is attenuated to the desired diameter, coated with a plastic resin which acts as a protector and lubricant, and then wound on a drum for storage and eventual rewinding into a test ring structure. This much of the process is to be conducted in a controlled atmosphere to minimize corrosion of the glass filament by water vapor. The tensile strength of the newly formed monofilament will be measured before and after coating by the resin as well as the strength of filament would test rings made from the coated fiber. (Author)

AD-263 669 Div. 14, 26, 32
(TIPSB/CDW) OTS price $1.10

Science and Tech. Section, Air Information Div., Washington, D. C.
MECHANIZATION AND AUTOMATION OF THE SOVIET RUBBER INDUSTRY. A REVIEW OF SOVIET LITERATURE. 29 Aug 61, 6p. 19 refs. (AID rept. 61-122)

Unclassified report

DESCRIPTORS: *Rubber, *Industry, *USSR, Machines, Machine tools, Manufacturing methods, *Automation.

Studies on the automation of synthetic-rubber plants are being conducted by experimental design bureaus for automatic equipment of individual plants and by the Laboratory for Automatic Equipment, VNIISK (All-Union Scientific Research Institute of Synthetic Rubber). The newly organized Section for Automation of the Scientific and Technical Council, State Committee of the Council of Ministers USSR for Chemistry, has assumed the general supervision of these studies. On the whole, extensive automation (and mechanization) of the rubber industry is hampered by insufficient capacity of the general- and special-machinery industries, and the Soviet Government is forced to import modern equipment and even plants. Negotiations with Vickers to supply the Soviets with a plant for producing SBR rubber might be mentioned as the latest development in this field. (Author)

AD-263 748 Div. 14, 13, 3
(TIPSM/EJH) OTS price $1.60

Institute of Paper Chemistry, Appleton, Wis.
DEVELOPMENT OF AN IMPROVED DIFFUSION BOARD MATERIAL.
Monthly progress rept. no. 11, 29 July-28 Aug 61, by L. E. LePorte and T. A. Howells. 25 Sep 61, 14p. incl. illus. tables.
(Contracts DA 18-108-405-cml-941 and DA 18-108-cml-6561)

Unclassified report

DESCRIPTORS: (*Fiberboard, *Wood pulp fibers, Wood pulp, Paper, Additives, Charcoal, Water, Absorption, Aging, Deterioration, Poisonous gases, Cyanogen chlorides, Penetration, Fungicides, Fungicidal coatings.) (*Shelters, Fiberboard, Chemical warfare agents, Poisonous gases.)

Extrapolation of isothermal water absorption curves for charcoal-loaded board to 100% RH indicates that the minimum water absorption that can be approached through sizing would be approximately 9.5 vol-%. Measurements of the pH of the cold water extract from aged boards did not indicate the existence of any gross acid conditions which might account for the deterioration of the board; this does not preclude some localized

process involving the presence of acidic material. Accelerated aging for one week under tropical conditions resulted in deterioration of the cyanogen chloride gas lives of all sized boards and all unsized boards with the smallest change in the unsized board formed from repulped newspaper. Boards containing additions of the fungicides tributyltin oxide and copper pentachlorophenate were submitted for gas life testing. Surface treatment was considered as a means of fungicide application. (Author)

AD-263 791 Div. 14, 27, 12
(TIPSM/BRW) OTS price $1.10

Bendix Products Div., Bendix Corp., South Bend, Ind.
SERVICES TO GENERATE BASIC ENGINEERING DATA ON THE BEHAVIOR OF PLASTIC COMPOSITE STRUCTURES UNDER VARIOUS CONDITIONS OF STRESS.
Periodical summary letter no. 6, 1-31 Aug 61, by F. F. Weldy. 15 Sep 61, 3p.
(Contract NOw 61-0488-c)
Unclassified report

DESCRIPTORS: (*Plastics, *Pressure vessels, *Rocket cases, Filament wound construction, Glass textiles, Reinforcing materials, Resins, Laminates, Structures, Stresses, Hydrostatic pressure, Tests.)

Three 7-in.-diam pressure vessels and D-ring specimens were fabricated. Two of the pressure vessels were tested. One failed at 1195 psi and the other at 1600 psi. The same wrappings were used in both cases except that a perforated Mylar pressure wrap was used on the case which failed at 1195 psi and a solid pressure wrap was used on the other. High circumferential wrap tension (0.76 lb/per end) was used on both cases; the technique was improved on the second case to produce better quality.

AD-263 891 Div. 14, 4
(TIPSM/EJH) OTS price $13.00

Hooker Chemical Corp., Niagara Falls, N. Y.
RESEARCH AND DEVELOPMENT OF HIGH TEMPERATURE STABLE ORGANO-PHOSPHORUS COMPOUNDS.
Rept. for May 60-Apr 61, on Non-Metallic and Composite Materials,
by Charles F. Baranauckas, Richard D. Carlson, and others. Apr 61, 184p. incl. illus. tables, 321 refs.
(Contract AF 33(616)7191, Proj. 7340)
(ASD TR 61-4) Unclassified report

DESCRIPTORS: (*Metalorganic compounds, Methanes, Ethylenes, Pentyl radicals, Phenyl radicals, *Phosphines, *Phosphine oxides, *Phosphorus compounds, Sulfides, Chemical reactions, Synthesis, High temperature research, Thermochemistry, Stability, Decomposition, Molecular structure, Infrared spectroscopy, Test methods.) (*Lubricants, *Airplane engine oils, Fuel oil, Fuels, High temperature research, *Aviation fuels, Bibliography.)

A series of alkylene and arylenebisdiphenylphosphines and the corresponding bisphosphine oxides were prepared by modification of existing synthetic methods. Thermal testing by a weight loss and chemical change technique was carried out at 300-450 C in a N atmosphere. The arylenebisphosphines and bisphosphine oxides are more stable than alkylene, with the tri- and tetramethylene and the neopentylene being the most stable alkylene bridges. The aromatic series appears to begin change by losing ring hydrogen with subsequent ring condensation. The alkyls all seem to produce P-O-R structures or, in the case of phosphines, P-H and products derived therefrom. A thermal study of simple arylphosphines and arylphosphine oxides and sulfides has yielded some clues to decomposition routes, which with the above data allow some tentative suggestions on mechanisms to be made. (Author)

15. MATHEMATICS

AD-263 101 Div. 15
(TIPSP/MFA) OTS price $2.60

Statistical Techniques Research Group, Princeton U., N. J.
THE VARIANCE OF MEANS OF SYMMETRICALLY TRIMMED SAMPLES FROM NORMAL POPULATIONS, AND ITS ESTIMATION FNOM SUCH TRIMMED SAMPLES. (TRIMMING/WINSORIZATION I),
by Donald H. McLaughlin and John W. Tukey.
July 61, 24p. incl. illus. tables (Technical rept. no. 42)
(Contract DA 36-034-ORD-2297, Proj. PB2-0001)
(AROD rept. no. 1715:39) Unclassified report

DESCRIPTORS: (*Statistical analysis, *Sampling, Distribution theory, *Statistical distributions.) (Series, Algebra, *Tables.)

A statistical analysis is made on the use of the mean of a symmetrically trimmed sample as an indicator of location. The use of the total sum of squares of deviations of the same trimmed sample as an indicator of the variability of the trimmed mean is explored. The increase in variance (of the trimmed mean as compared with the untrimmed mean) when trimming samples from an exactly normal distribution is found to be less than 3%, 6%, 9%, and 14%, respectively, when a total of 1/10, 2/10, 3/10/ or 4/10 of the sample is trimmed away. The loss of normal-theory efficiency is given for all symmetric trimmings of samples of size is less than or equal to 20. The appropriate divisor, by which the trimmed sum of squares of deviations is to be divided to obtain an estimate of the variance of the trimmed mean, is given in tabular summary.

AD-263 103 Div. 15
(TIPSP/MFA) OTS price $1.60

Space Technology Labs., Inc., Los Angeles, Calif.
CALCULATION OF SUPERSONIC FLOW AROUND AXISYMMETRIC FLARES,
by H. E. Wohlwill. 21 May 58, 16p. incl. illus.
(Rept. no. GM-TN-0165-00147)
Unclassified report

DESCRIPTORS: (*Aerodynamics, *Supersonic flow, *Axially symmetric flow, *Conical bodies.) (*Mathematical computer data, Programming.) (*Shock waves, Velocity, Enthalpy, Entropy.)

A machine program for the computation of supersonic flow around an axisymmetric flare is described. The computation consists of the following parts: (1) The oblique shock problem in which upstream flow properties vary with position. (2) Calculation of the initial shock angle at the compression corner. (3) Insertion of characteristics for uniformity of mesh size.

AD-263 105 Div. 15
(TIPSP/MFA) OTS price $1.10

Harvard U., Cambridge, Mass.
MATHEMATICS. POLYNOMIALS OF BEST APPROXIMATION ON A REAL FINITE POINT SET,
by J. L. Walsh and T. S. Motzkin. 8 July 57, 5p.
(Sponsored by Office of Naval Research and Air Force Office of Scientific Research; In cooperation with California U., Los Angeles)
Unclassified report

DESCRIPTORS: (*Mathematics, *Numerical analysis, Algebra, *Polynomials, Functions.)

A statement, without proof, is made for polynomials of best approximation to a given function on a real finite point set, E. These are important in numerical computation where they have various properties in common, especially those relating to oscillation of the difference on E.

AD-263 162 Div. 15, 25
(TIPSP/WLH) OTS price $2.60

Carnegie Inst. of Tech., Pittsburgh, Pa.
PSEUDO-HAMILTONIAN MECHANICS.
Technical rept. no. 51 on Mathematical Analysis of Electrical and Mechanical Systems,
by R. J. Duffin. 23 June 61, 23p. (Rept. no. CIT-ORD-6D-TR51)
(Contract DA 36-061-ORD-490, Proj. TB2-0001)
(AROD rpt. no. 223:56) Unclassified report

DESCRIPTONS: (*Applied mathematics, Matrix algebra, *Special functions.) (Electricity, Electrical networks, Mechanics.) Applied mathematics.

Hamilton's canonical equations are a set of 2n ordinary differential equations which can be used to describe the motion of a conservative mechanical system with n degrees of freedom. This analysis is a study of a generalization in which an additional parameter is introduced in Hamilton's equations. The new set of equations can be used to describe the motion of systems which dissipate energy. In particular these equations may be applied to electrical networks. (Author)

AD-263 210 Div. 15, 25, 30
(TIPSP/TL) OTS price $1.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
CHARACTERISTIC EXPONENTS OF MATHIEU FUNCTIONS,
by T. Tamir. 28 June 61, 14p. incl. illus. tables (Research rept. no. PIBMRI-922-61)
(Contract AF 19(604)7499)
(AFCRL-585) Unclassified report

DESCRIPTORS: (*Special functions, *Differential equations, Tables, Theory, *Dielectrics, *Digital computers, Programming, Wave transmission.)

Problems involving periodic structures sometimes necessitate the solution of a Mathieu differential equation. The characteristic exponent of Floquet-type solutions was tabulated in the first three stable regions, with the help of a digital computer. The method used, as well as some details of programming are also discussed. (Author)

AD-263 219 Div. 15, 26
(TIPSP/WLH) OTS price $3.60

Rand Corp., Santa Monica, Calif.
ON THE SOLUTION OF TWO-STAGE LINEAR PROGRAMS UNDER UNCERTAINTY. NOTES ON LINEAR PROGRAMMING AND EXTENSIONS. PART 55,
by George B. Dantzig and Albert Madansky.
10 Aug 61, 30p. (Research memo. no. RM-2751)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Computers, *Programming, *Linear programming, *Scheduling, Algebra, Matrix algebra.

Division 15 - MATHEMATICS

A possible method for compensating for uncertainty in linear-programming problems is to replace the random elements by expected values or by pessimistic estimates of these values, or to recast the problem into a two-stage program so that, in the second stage, one can compensate for inaccuracies in the first stage. The purpose of this analysis is to examine the last of these methods in detail. More precisely, it investigates the conditions under which the first-stage decisions are optimal. In addition, formulas for using various existing computational algorithms to obtain an optimal solution are given. (Author)

AD-263 221 Div. 15, 29, 30
(TIPSP/MFA) OTS price $1.60

Stanford Research Inst., Menlo Park, Calif.
COMPUTATION FOR THE REDISTRIBUTION MODEL WITH SET-UP CHARGE,
by S. G. Allen. July 61, 11p. incl. tables.
(Technical memo. no. 20)
(Contract Nonr-231100)
Unclassified report

DESCRIPTORS: *Computers, *Programming, Procurement, *Functions, Tables, Equations, Complex variables, Integrals, *Naval supplies.

The program and computations are presented for the calculations in the redistribution model for set-up charges. The main tools in the calculations are two tables, one yielding the values of a function of one variable, and the other, a function of two variables. A procurement policy is suggested based upon an economic method for determining simultaneously procurement, allocation, and redistribution.

AD-263 226 Div. 15
(TIPSP/MFA) OTS price $1.60

Research Triangle Inst., Durham, N. C.
GOODNESS-OF-FIT TESTS ON A CIRCLE, II,
by G. S. Watson. 22 Aug 61, 12p. (Technical rept. no. 1; S-37)
(Contract Nonr-342300)
Unclassified report

DESCRIPTORS: (*Statistical analysis, *Sampling, *Statistical tests, Statistical functions, Distribution theory, *Probability, *Curve fitting, Bird flight.) (Equations, *Integral transforms, Series, *Tables.) (*Computers, Programming, Difference equations.)

A statistical analysis is made by use of the null hypothesis test for random samples which have been drawn from a population with the continuous distribution function F(x). It is useful for distributions on a circle since its value does not depend on the arbitrary point chosen to begin cumulating the probability density and the sample points. Sampling experiments on bird flight are plotted by use of an IBM 650 computer.

AD-263 227 Div. 15
(TIPSP/MFA) OTS price $6.60

Mathematics Research Center, U. of Wisconsin, Madison.
THE RIESZ TRANSFORM. PART I. TENSOR FUNCTIONS,
by Eduardo H. Zarantonello. June 61, 61p. 14 refs.
(MRC Technical summary rept. no. 185)
(Contract DA 11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Mathematical analysis, *Tensor analysis, *Functions, Algebra, Geometry, Integrals, *Integral transforms, Partial differential equations.

A coordinateless account of the elements of tensor algebra and tensor calculus and a brief account of the theory of generalized differential operators on differentiable manifolds is presented. In tensor calculus coordinates may be looked upon in two different ways: first, as a description of manifolds in terms of lower dimensional ones; second, as a nonmenclature of coordinate notations. The treatment is a synthetic one whereby the relations between manifold and surrounding space are emphasized rather than ignored. Proofs, when given, are simply outlined and become more explicit as the subject matter is developed.

AD-263 228 Div. 15
(TIPSP/MFA) OTS price $10.10

Mathematics Research Center, U. of Wisconsin, Madison.
THE RIESZ TRANSFORM. PART II. POTENTIAL OPERATORS,
by Eduardo H. Zarantonello. June 61, 121p.
20 refs. (MRC technical summary rept. no. 186)
(Contract DA 11-022-ORD-2059)
Unclassified report

DESCRIPTORS: (Transformations (Mathematics), Integration.) (Theory, Functions, Tensor analysis.) *Series, *Groups (Mathematics), *Integral equations, Operators (Mathematics).

A mathematical analysis is made by use of the Riesz transform in which potential operators are integral operators whose kernels can be made differentiable by subtracting finite sums of products of integer powers of the distance with infinitely differentiable kernels. The most interesting property of these operators is one which asserts that the product of any number of potential operators is in essence, a potential operator. Several theorems and proofs are presented.

AD-263 229 Div. 15
(TIPSP/MFA) OTS price $2.60

Mathematics Research Center, U. of Wisconsin, Madison.
EFFICIENCY OF CERTAIN METHODS OF ESTIMATION FOR THE NEGATIVE BINOMIAL AND THE NEYMAN TYPE A DISTRIBUTIONS,
by S. K. Katti and J. Gurland. July 61, 17p.
incl. illus. tables (MRC Technical summary rept. no. 241)
(Contract DA 11-022-ORD-2059)
Unclassified report

DESCRIPTORS: (*Mathematical analysis, Matrix algebra, Equations, *Binomials, *Statistical analysis, Statistical tests, *Probability.) (Theory, *Distribution theory, Functions, Series, Tables.)

A mathematical study is made of the asymptotic efficiency of certain methods of estimation for the negative binomial and the Neyman Type A distributions. The efficiency of the method of moments for these distributions is found to be high for certain triangular shaped regions in

parameter space and in these triangular shaped regions variances of the distributions are close to their respective means. It is concluded that the methods using three statistics are asymptotically more efficient than the ones using only two statistics. An appendix is provided in which the efficiency of the statistical data for the various methods are listed in a group of tables.

AD-263 230 Div. 15, 8
(TIPSP/MLA) OTS price $3.60

Mathematics Research Center, U. of Wisconsin, Madison.
MATHEMATICAL FOUNDATIONS OF DIFFRACTION THEORY,
by Calvin H. Wilcox. Aug 61, 97p. (MRC Technical summary rept. no. 256)
(Contract DA 11-022-ORD-2059)
Unclassified report

DESCRIPTORS: (*Electromagnetic theory, Electromagnetic waves, Electromagnetic fields, *Diffraction, Metals.) (*Mathematics, Vector analysis, Partial differential equations, Functional analysis, Theory.)

A mathematical study is made on the problem of the electromagnetic theory to determine the diffracted electromagnetic wave which is produced when a prescribed wave, propagating in a homogeneous isotropic dielectric medium, strikes a prescribed metallic obstacle. The foundations for a mathematical theory of this problem are developed together with theorems which demonstrate the existence and uniqueness of the solution and theorems which describe its functional properties. (Author)

AD-263 243 Div. 15, 16
(TIPSP/MFA) OTS price $6.60

New York State Coll. of Agriculture, Cornell U., Ithaca.
MOMENT ESTIMATORS FOR MIXTURES OF BINOMIAL DISTRIBUTIONS.
Doctoral thesis,
by Wallace R. Blischke, 1961, 70p. incl. illus. tables, 15 refs. (Technical rept. no. 6)
(Contract Nonr-40139, Proj. no. NR 042-212)
Unclassified report

DESCRIPTORS: (*Statistical analysis, *Binomials, *Distribution theory, Mixtures, Fishes, *Genetics.) (*Functions, Equations, Polynomials, Matrix algebra, *Series, Integration.) Tables.

Two aspects to the problem of estimation in dealing with mixtures of distributions are considered. The first is the question of identifiability. A distribution function F which is a probability mixture of distribution functions belonging to some family D is identifiable if F can be written in only one way as a probability mixture of elements of D. The second aspect of the estimation problem is concerned with the construction for identifiable mixtures of estimators of the parameters of the component distributions and of the mixing measure. These problems are considered for mixtures of a known finite number. (Author)

AD-263 313 Div. 15
(TIPSP/MFA) OTS price $1.60

Wayne State U., Detroit, Mich.
ON A THEOREM OF YANO AND NAGANO,
by S. I. Goldberg. July 61, 11p.
(Contract AF 49(638)967)
(AFOSR-1084) Unclassified report

DESCRIPTORS: *Groups (Mathematics), Algebra, *Algebraic topology, Transformations (Mathematics) Integration, Integral transforms.

A complete, connected Einstein space of dimension m greater than 2 on which there exists a vector field generating globally a one-parameter group of non-homothetic transformations is homeomorphic with the m-sphere. This statement is valid for any complete, connected Riemannian manifold if it were known for a manifold of (positive) constant scalar curvature. Evidence is presented strengthening this conjecture. It is shown that if M is a compact Riemannian manifold which is not a homology sphere, then an infinitesimal conformal transformation of M is an infinitesimal isometry. In particular, if a compact, simply connected symmetric space of a connected Lie group admits a non-homothetic transformation (belonging to the connected component of the group of conformal transformations of M) then M is isometric with the m-sphere. (Author)

AD-263 322 Div. 15
(TIPSP/MFA) OTS price $4.60

California U., Berkeley.
DIFFERENTIAL FORMS ON REGULAR AFFINE ALGEBRA,
by G. Hochschild, Bertram Kostant, and Alex Rosenberg. Aug 61, 46p. 14 refs. (Technical rept. no. 21)
(Contract AF 49(638)79)
(AFOSR-883) Unclassified report

DESCRIPTORS: Mathematics, *Algebras, *Algebraic topology, *Algebraic geometry, Differential geometry, Tensor analysis.

A mathematical discussion of the algebras of differential forms is treated as a special combination of linear algebra and homological alegbra. There is specific identification of this particular exterior algebra as applied to canical graded algebra based on the Tor functor and obtained by the cohomology of differential forms from the ext functor to a universal algebra i. e. Lie algebra. Attention is directed chiefly to a regular affine algebra, K-algebra, which is Noetherian with a finite Krull dimension, i. e. the largest non-negative integer.

AD-263 352 Div. 15
(TIPSP/MFA) OTS price $3.60

Applied Mathematics and Statistics Lab., Stanford U., Calif.
APPLICATION OF INTEGRAL OPERATORS TO THE THEORY OF EQUATIONS OF MIXED TYPE,
by Stefan Bergman and Ranko Bojanic. 28 Aug 61, 36p. (Technical rept. no. 98)
(Contract Nonr-22511, Proj. NR-041-086)
Unclassified report

DESCRIPTORS: (*Theory, *Equations, Partial differential equations, Complex variables, *Functions.) *Operators (Mathematics), Integrals.

Integral operators are applied to the theory of equations of mixed type which transform analytic functions into solutions of linear partial differential equations with analytic coefficients. The importance of integral operators is based on the fact that they not merely generate solutions of a particular linear partial differential equation but frequently they preserve various properties of the associates, i.e, analytic functions to which the operator is applied. This analysis generalizes Bergman's investigations of this type and at the same time simplifies his method.

Division 15 - MATHEMATICS

AD-263 401 Div. 15, 2
(TIPSP/JSM) OTS price $5.60

Naval Weapons Lab., Dahlgren, Va.
TRANSLATION OF RUSSIAN PAPERS ON THE ERRORS IN NUMERICAL INTEGRATION OF THE EQUATIONS OF CELESTIAL MECHANICS,
tr. by E. C. Hubbard and Blanchie M. Hubbard.
17 Aug 61, 49p. (Trans. from Byulleten' Instituta Teoreticheskoy Astronomii 7:257-286, 1959)
Unclassified report

DESCRIPTORS: (*Celestial mechanics, Errors, *Differential equations, *Integration, Theory.) (Translations, USSR.)

This report includes:
THE ESTIMATION OF THE ERROR RESULTING FROM NUMERICAL INTEGRATION OF THE EQUATIONS OF CELESTIAL MECHANICS, by V. F. Myachin. (1959): This article presents the result of the application of a general theory of estimation of the numerical integration error of differential equations, proposed by Professor S. M. Lozinsky, to equations of undisturbed motion of celestial mechanics. In applying the theory, consideration was given to the random character of the round-off error. Here, in particular, it is shown that the new theory gives qualitative confirmation of the well-known result of Brouwer, which asserts that after a sufficiently large number, k, of integration steps the error in the coordinates of elliptic motion has the order of growth k(3/2).
THE ACCUMULATION OF NUMERICAL INTEGRATION ERRORS IN SOME PROBLEMS OF CELESTIAL MECHANICS, by A. S. Sochilina. (1959): The result of the application of estimations of errors in numerical integration (Myachin, 1959) to numerical examples are presented. (Author)

AD-263 583 Div. 15, 22
(TIPSP/MFA) OTS price $2.60

Rand Corp., Santa Monica, Calif.
SOME CHARACTERISTICS OF THE ELLIPTIC GAUSSIAN DISTRIBUTION,
by Roger Snow. Sep 61, 24p. incl. illus. table.
(Research memo. no. RM-2765-PR)
(Contract AF 49(638)700)
Unclassified report

DESCRIPTORS: (Free fall missiles, *Bombs, Offset bombing.) (*Functions, *Bessel functions, Mathematical prediction, *Statistical processes, Probability.)

The distribution of the point of impact of bombs, missiles, and other projectiles frequently is approximately Gaussian (normal) in character. If the dispersion is equal along any two perpendicular axes, then the impact probability law is termed circular Gaussian; if the dispersion is not equal along perpendicular axes, then the probability law is called elliptical Gaussian. An evaluation is made of the integral of an elliptical Gaussian over a circle of radius R, i.e., the probability of a missile landing within a circle of radius R if aimed at the center and subjected to an elliptical Gaussian impact probability distribution. An equivalent problem is shown to be the evaluation of the integral of a circular Gaussian over an ellipse. This integral, termed the elliptic coverage function, is expressed as the difference of two circular coverage functions. A short table of the elliptic coverage function is presented in a convenient graphical form. Some characteristics of the circular probable error and the quartiles of an elliptic Gaussian are presented in graphical form. (Author)

AD-263 608 Div. 15
(TIPSP/MFA) OTS price $1.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
QUATERNARY CYCLIC CODES,
by Gustave Solomon. 13 Sep 61, 14p. (Rept. no. 47G-0022)
(Contract AF 19(604)7400)
(ARPA Order no. 56-61) Unclassified report

DESCRIPTORS: *Information theory, Groups (Mathematics), Number theory, Difference equations, Polynomials, Coding.

Cyclic codes are considered for the quaternary alphabet, the field K = GF(2) squared. If A is a (k,n) (n odd) quaternary group codes - i.e., a k-dimensional subspace of ordered n-tuples of K elements - then A is isomorphic via the Solomon-Mattson polynomials, to a subgroup of the direct product of K with r copies of L. (L is the smallest field over K containing the nth roots of unity and r is the number of irreducible factors of x to the n power + 1/x + 1 over K.) Let d(A,K) be the minimum weight of non-zero vectors of A. For p, a prime, and A, a (k,p) cyclic K code, d(A,K) greater than or equal to d(A,F) where d(A,F) is the Bose-Chaudhuri bound for the corresponding binary cyclic codes of the same order (if there is one). Number theoretic methods are introduced to improve the Zierler-Gorenstein lower bound for certain primes p. For p such that 2 has multiplicative order p-1, there exists (p +1/2, p) cyclic codes with d(p) greater than or equal to 3 is 3 is not a quadratic residue of p, d(p) greater than or equal to 4 if 3 is a quadratic residue of p, and d greater than or equal to 5 if both 3 and 5 are quadratic residues of p. (Author)

AD-263 628 Div. 15
(TIPSP/MFA) OTS price $3.60

Rand Corp., Santa Monica, Calif.
THE DECOMPOSITION ALGORITHM FOR LINEAR PROGRAMMING. NOTES ON LINEAR PROGRAMMING AND EXTENSIONS. PART 57,
by George B. Dantzig and Philip Wolfe. Sep 61, 28p. incl. illus. (Research memo. no. RM-2813-PR)
(Contract AF 49(638)700)
Unclassified report

DESCRIPTORS: *Linear programming, *Operations research, Scheduling, Equations, Matrix algebra.

A procedure is presented for the efficient computational solution of linear programs having a certain structural property characteristic of a large class of problems of practical interest. This property makes possible the decomposition of the problem into a sequence of small linear programs whose iterated solutions solve the given problem through a generalization of the simplex method for linear programming. (Author)

AD-263 723 Div. 15
(TIPSP/TL) OTS price $11.00

Applied Mathematics and Statistics Labs., Stanford U., Calif.
TOTAL POSITIVITY, ABSORPTION PROBABILITIES AND

APPLICATIONS,
by Samuel Karlin. 7 Aug 61, 145p. 35 refs.
(Technical rept. no. 28)
(Contract Nonr-22528, Proj. NR 047-019)
Unclassified report

DESCRIPTORS: (*Probability, Integral transforms, Matrix algebra, Partial differential equations, Integral equations, Functions, Inequalities, Measure theory, Series, Statistical distributions, Functional analysis, Sequences.) Absorption.

AD-263 730 Div. 15
(TIPSP/TL) OTS price $3.60

Numerical Analysis Research, U. of Calif., Los Angeles.
EXPERIMENTS WITH A METHOD OF M. R. HESTENES FOR COMPUTING (REAL) EIGENVALUES AND ASSOCIATED EIGENVECTORS OF A (REAL) MATRIX,
by Paul A. White. Sep 61, 31p. incl. tables.
(Contract DA 04-495-ORD-1630, Proj. TB 2-0001 (1210))
Unclassified report

DESCRIPTORS: (*Integral equations, *Matrix algebra, *Combinatorial analysis, Numerical analysis, *Vector analysis, *Tensor analysis.) (Theory, Tests.) Errors.

AD-263 770 Div. 15
(TIPSP/MFA) OTS price $3.60

Naval Ordnance Test Station, China Lake, Calif.
ESTIMATES OF VARIANCE IN LEAST SQUARES TRAJECTORY PARAMETERS OBTAINED USING TENSOR ANALYSIS,
by Frank C. Reed. 1 Dec 60, 30p. (NOTS TP 2591, Suppl. to NOTS 1376, AD-220 478)
(NAVWEPS rept. no. 7600, Suppl. to NAVORD rept. 5032, AD-220 478) Unclassified report

DESCRIPTORS: (Statistical analysis, *Statistical data, *Guided missile trajectories, *Least squares method, *Tensor analysis.) (Functions, Equations, Polynomials, *Matrix algebra, Taylor's series.)

A statistical investigation is made of various trajectory parameters by use of tensor analysis. The method of solution by least squares is used. There are 4 parts as follows: (1) the analysis of basic data curves, (2) data adjustment, (3) application of the Gaussian approximation formula and, (4) a discussion of assumptions from the basic data.

AD-263 772 Div. 15
(TIPSP/WH) OTS price $1.60

Naval Ordnance Test Station, China Lake, Calif.
EXTENDED TABLE OF PERCENTAGE POINTS OF THE CHI-SQUARE DISTRIBUTION,
1 Aug 61, 18p. incl. tables (NOTS TP 2749)
(NAVWEPS rept. no. 7770) Unclassified report

DESCRIPTORS: (*Statistical tests, Statistical functions.) (Tables, Reliability, Digital computers.)

A table of percentage points of the Chi-square distribution was computed on the IBM 704, using the Cornish-Fisher approximation. The degrees of freedom are from f equals 1 to 300 in unit steps, and 14 percentage points are covered as follows: .995, .990, .975, .950, .900, .750, .500, .250, .200, .100, .050, .025, .010, and .005. Percentage points for 30 or fewer degrees of freedom were reproduced from existing tables of exact values. For degrees of freedom from f equals 31 to 300, the Cornish-Fisher approximation was used. A table is included showing a comparison of the exact percentage points and the approximate values for f equals 30, 40, 50, 60, 70, 80, 90, and 100 degrees of freedom. (Author)

AD-263 776 Div. 15
(TIPSP/MA) OTS price $1.10

Statistical Lab., U. of Calif., Berkeley.
ON THE DISTRIBUTION OF CERTAIN QUADRATIC FORMS IN NORMAL VARIATES,
by B. R. Bhat. 1961, 10p.
(Contract Nonr-22243)
Unclassified report

DESCRIPTORS: (Statistical analysis, *Statistical distributions.) (Functions, Equations, Algebra, *Functional analysis, *Matrix algebra.)

AD-263 785 Div. 15
(TIPSP/MFA) OTS price $1.60

Columbia U., New York.
TESTING STATISTICAL HYPOTHESES. THE COMPOUND APPROACH,
by Herbert Robbins and Ester Samuel. 15 Sep 61, 12p. incl. illus. (Rept. no. CU-31-61-Nonr-22659-MS)
(Contracts Nonr-26659, Proj. 042-205 and Nonr-26633, Proj. NR 042-034)
Unclassified report

DESCRIPTORS: (Statistical analysis, *Statistical functions, *Statistical tests, *Distribution theory, Probability.) (*Functions, Equations, Integrals, *Series.)

A summary is made on the testing of a hypothesis in statistical decision theory. The basic problem considered is that there are two possible states of nature, symbolized by a parameter theta which can assume only the values 0 and 1. The value of theta is unknown, but an observable random variable x with values in some space E has a probability distribution P sub theta which depends on theta in a known way.

AD-263 800 Div. 15
(TIPSP/MFA) OTS price $11.00

Purdue Research Foundation, Lafayette, Ind.
ANALYTIC THEORY OF CONTINUOUS TRANSFORMATIONS. I,
by Togo Nishiura. Aug 59, 67p. (Technical note no. 20; PRF Rept. no. 1203, pt. 1)
(Contract AF 18(600)1484, Proj. no. 17501)
(AFOSR TN 59-496, pt. 1) Unclassified report

DESCRIPTORS: (Topology, Algebraic topology, Combinatorial analysis, Scheduling.) (Theory, *Functions, Integrals, Complex numbers.)

An analysis of the theory of continuous transformations is made. It concerns the analog of the Geocze area of mappings from specific subsets of Euclidean K-space, E sub K, and Euclidean N-space, E sub n. By use of combinatorial topology and algebraic topology the notion of polyhedral regions is defined. Theorems and proofs of constructions of certain polyhedral regions are presented.

Division 15 - MATHEMATICS

AD-263 803 Div. 15
(TIPSP/TL) OTS price $1.60

Purdue Research Foundation, Lafayette, Ind.
ANALYTIC THEORY OF CONTINUOUS TRANSFORMATIONS. III,
by Togo Nishiura. Aug 59, 15p. 22 refs. (Technical note no. 22; PRF rept. no. 1203)
(Contract AF 18(600)1484; Proj. 17501)
(AFOSR TN 59-496, pt. 3)
Unclassified report

DESCRIPTORS: (*Transformations (Mathematics), *Functions, Algebra, Topology, *Algebraic topology, Integrals, Partial differential equations, Combinatorial analysis, *Inequalities, Theory.)

This analysis deals with the generalized length of a contour and the Cavalieri inequality for continuous mappings defined on admissible sets in the plane. (Author)

AD-263 808 Div. 15
(TIPSP/TL) OTS price $3.60

Institute for Fluid Dynamics and Applied Mathematics, U. of Maryland, College Park.
ON THE FORMULATION OF FINITE DIFFERENCE ANALOGUES OF THE DIRICHLET PROBLEM FOR POISSON'S EQUATION,
by J. H. Bramble and B. E. Hubbard. Sep 61, 35p. incl. illus. (Technical note BN-257)
(Contract AF 49(638)228; Proj. 17501)
(AFOSR-1404) Unclassified report

DESCRIPTORS: (*Probability, Difference equations, Operators (Mathematics), Matrix algebra, Partial differential equations, *Inequalities, Differential equations.) (Analysis, Theory, Errors.)

Obtained in this analysis are some estimates of the type given by Gerschgorin. A general theorem is stated which can be used as a guide in the formulation of finite difference analogues of the Dirichlet problem for Poisson's equation. Various examples are given and analyzed; included among these are analogues whose truncation error is shown to be O(h4). (Author)

AD-263 809 Div. 15
(TIPSP/TL) OTS price $2.60

Institute for Fluid Dynamics and Applied Mathematics, U. of Maryland, College Park.
ON THE GEOMETRIC CHARACTER OF SINGULARITY MANIFOLDS FOR HARMONIC FUNCTIONS IN THREE VARIABLES. I,
by R. P. Gilbert. Sep 61, 18p. (Technical note BN-256)
(Contract AF 49(638)228; Proj. 17501)
(AFOSR-1045) Unclassified report

DESCRIPTORS: (*Differential geometry, Operators (Mathematics), Complex variables, *Functions, Differential equations, Matrix algebra, Polynomials, *Algebraic topology.) Theory.

The singularities of harmonic functions in three variables is investigated. This is done by considering harmonic functions generated by the Whittaker-Bergman operator, and the connections between the singularities of these functions and those of the associated functions of two complex variables. Several theorems are obtained concerning the nature of these singularities by using the methods of projective differential geometry. (Author)

AD-263 822 Div. 15
(TIPSP/MFA) OTS price $6.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
ON THE WILLIS METHOD OF FINDING SEPARATING SYSTEMS.
Technical rept. on Mathematics,
by Sze-Tsen Hu. Dec 60, 69p. (Rept. no. 6-90-61-44)
Unclassified report

DESCRIPTORS: (Mathematical prediction, *Mathematical logic, *Functions, Integrals.) (Equations, *Combinatorial analysis, *Complex variables.)

The questions of the existence and uniqueness of the solutions of the Willis method for finding separating systems for linearly separable functions of one, two, three, and four variables are discussed. It is shown that, although not all solutions are necessarily unique, the standard separating system is always contained within the the set. The method is applied by considering all possible linearly separable functions as divided into classes characterized by rank, dimension, and secondary numbers. (Author)

AD-263 823 Div. 15
(TIPSP/MFA) OTS price $2.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
ON THE CLASSIFICATION OF LINEARLY SEPARABLE TRUTH FUNCTIONS.
Technical rept. on Mathematics,
by Sze-Tsen Hu. Jan 61, 17p. (Rept. no. 6-90-61-26)
Unclassified report

DESCRIPTORS: (*Mathematical logic, *Combinatorial analysis.) (Functions, Equations, Integrals, *Complex variables.)

A solution to the classification problem of the linearly separable truth functions of n variables by reducing it to the enumeration of a special kind of truth functions called canonical truth functions is given. The classification problem is formulated and the canonical truth functions are defined. The key lemma is proved, and the reduction is described. (Author)

AD-263 829 Div. 15, 8
(TIPSP/TL) OTS price $3.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
AN INTRODUCTION TO NETWORK ANALYSIS. PART 1. RELATION BETWEEN MATRIX ALGEBRA AND NETWORK GEOMETRY,
by H. J. Carlin and A. B. Giordano. 11 July 60, 33p. incl. illus. (Rept. no. PIBMRI-843-60)
(Contract AF 30(602)2213, Proj. 8505)
(RADC TR 61-44, pt. 1) Unclassified report

DESCRIPTORS: (*Matrix algebra, Geometry, *Topology.) (Analysis, Theory.) (*Microwave networks, *Electrical networks, *Circuits.) (Transformers, Electric currents, Voltage.)

A direct application of Kirchhoff's Laws leads to network equations which relate unknown quantities to known quantities. Various procedures usually described as mesh analysis and nodal analysis are available which translate the variables into a simplified set of independent equations. Matrix methods are used to investigate the network equations. The material is presented in an introductory fashion with the pertinent elementary properties of determinants and matrices given in the text. Based on the matrix approach, topological and connective properties of network geometry are deduced. (Author)

AD-263 830 Div. 15, 8
(TIPSP/TL) OTS price $4.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
AN INTRODUCTION TO NETWORK ANALYSIS. PART 2. MESH AND NODAL ANALYSIS OF NETWORDS,
by H. J. Carlin and A. B. Giordano. 21 Sep 60, 41p. incl. illus. (Rept. no. PIBMRI-844-60)
(Contract AF 30(602)2213, Proj. 8505)
(RADC TR 61-44, pt. 2) Unclassified report

DESCRIPTORS: (*Matrix algebra, Geometry, *Topology, *Functions.) (Analysis, Theory, Measurement.) (*Microwave networks, *Electrical networks, *Circuits, *Coupling circuits, *Tuned circuits, Excitation.) (Transformers, Magnetic cores, Electric currents, Voltage, Coils, Generators, Magnetism.)

In Part 1, (AD-263 829), the concept of matrix algebra was introduced to derive fundamental properties of networks based upon knowledge of the network graph. In the following Part 2, these properties will be combined to yield analysis procedures and solutions based upon mesh and nodal quantities. (Author)

AD-263 877 Div. 15, 26
(TIPSP/WH) OTS price $1.60

Cornell U., Ithaca, N. Y.
A SCALE ESTIMATOR WITH SPECIAL APPLICATION TO THE WEIBULL DISTRIBUTION,
by John H. K. Kao. Sep 61, 14p. 16 refs.
(Technical rept. no. 6)
(Contract Nonr-40143)
Unclassified report

DESCRIPTORS: (*Statistical distribution, Scale, *Statistical analysis, Combinatorial analysis, Statistical functions.) (*Economics, Quality control, Statistical tests.) (Equations, Reliability, Semiconductors.)

An asymptotic estimator is proposed for a scale parameter, in closed form, of a general class of continuous distribution functions. The estimator is continued by introducing a multiplier for application to make truncated life-testing data and to distinguish cases for which the location parameter is known from those for which it is not. Examples are given for each case. A special application is made to the estimation of either the scale or shape parameter of the Weibull distribution using truncated or not truncated life-testing data. (Author)

AD-263 883 Div. 15, 30, 25
(TIPSP/GRW) OTS price $5.60

California U., Los Angeles.
DESIGN OF A FIXED PLUS VARIABLE STRUCTURE COMPUTER FOR THE SOLUTION OF A DIFFUSION EQUATION. PART I,
by B. Bussell and G. Estrin. July 61, 50p. incl. illus. tables (Rept. no. 61-33)
(Contract Nonr-23352)
Unclassified report

DESCRIPTORS: (*Heat transfer, Thermal conductivity, Thermal diffusion, Diffusion, Equations, Experimental data, *Programming.) (*Digital computers, Data transmission systems, Design, Mathematical analysis, Matrix algebra, Cybernetics.)

An investigation was made of a special organization of hardware to solve a two-dimensional heat conduction problem. The investigation indicated that a speed increase of seven times is possible over the normal sequential method used in solving the problem on the IBM 7090. The speed-up is achieved by use of a parallel computation procedure and the elimination of bookkeeping operations (which alone allows a speed increase of better than two) and the use of higher speed circuitry which is already beyond the laboratory stage. Further speed increases are possible through increased data transfer rates, multiple parallel V units and the addition of input-output equipment in V. All analyses were performed using average times for the various atomic processes. An examination of the possible maximum-minimum range of operation times indicate that a more detailed analysis should consider the queue problem which may result. A method for reorganizing V at electronic switching speeds was described. This method is sufficiently general to be useful in high-speed switching between selected problem types. (Author)

AD-263 885 Div. 15
(TIPSP/WH) OTS price $1.10

Cornell U., Ithaca, N. Y.
RESEARCH IN FUNCTIONS OF A COMPLEX VARIABLE.
Rept. for 16 Sep 60-15 Sep 61,
by G. R. Blakley. 15 Sep 61, 3p.
(Nonr Grant (G) 00013-60, Proj. NR 043-241)
Unclassified report

DESCRIPTORS: *Research program administration, *Functions, *Complex variables, *Metamathematics, Conformal mapping, Vector analysis.

16. MEDICAL SCIENCES

AD-263 120 Div. 16
(TIPSB/LH) OTS price $6.60

Texas A. and M. Coll., College Station.
THE STUDY OF BURN AND WOUND HEALING IN THE ALBINO RAT DEFICIENT IN VITAMINS AND OTHER ESSENTIAL FOOD SUBSTANCES.
Final rept.,
by Sidney O. Brown. Jan 61, 58p. incl. illus. tables, 27 refs.
(Contract DA 49-007-md-597)
Unclassified report

DESCRIPTORS: (*Burns, *Wounds, *Healing, Diet, Nutrition, Vitamins, Proteins, Therapy.)

In a series of studies comparing radiodensitometric techniques with histological methods, it was found that bone incisures were essentially healed by the end of 10 weeks. However, new bone was thinner than original shaft and somewhat spongy; older, original shaft bone had become thick but less dense with large porous areas. Bone healing in rats fed B-complex deficient diets did not show any severe retardation and was as rapid as in those animals on adequate levels of B-complex vitamin. Burn wounds showed no specific differences in rate of healing for animals on 5, 25, and 100% pyridoxine supplemented diets, nor did rats at these levels show symptoms of deficiency except for decreased size. Rats at 100% pyridoxine level failed to repair as rapidly as those on 5 and 25% levels. Over-all well being and particularly condition of reproductive organs were found to be related to caloric intake of male albino rats. Muscles, bone, and skin remained in youthful condition when animals were on sharply restricted diets, but endocrine and reproductive systems were not retarded in development by insufficient caloric intake. (Author)

AD-263 245 Div. 16
(TIPSB-JAB) OTS price $1.10

Fitzsimons General Hospital, Denver, Colo.
DEVELOPMENT AND EVALUATION OF AUTOMATIC PROCEDURES FOR THE DETERMINATION OF ALBUMIN, GLOBULIN, GLUTAMIC-OXALOACETIC TRANSAMINASE AND PROTEIN-BOUND IODINE IN SERUM.
Final rept. 1 Sep 60-20 Aug 61,
by Clarence O. Stevens and Nicholas G. Levandoski. 20 Aug 61, 6p.
(Proj. no. 6X97-87-007)
Unclassified report

DESCRIPTORS: (*Proteins, *Iodine compounds, Biochemical tests, Automatic, Calorimetry, Spectrophotometers.) (Enzymes, Albumins, Determination.)

A satisfactory automatic method was devised for measuring protein-bound iodine in serum. Methods developed by the Technicon Instruments Corp. for serum albumin and globulin were evaluated and found to be satisfactory for clinical purposes. Unsuccessful attempts were made to automate a serum glutamic-oxaloacetic transaminase assay using 4-amino-2,3-diethoxy benzanilide diazonium chloride as a color reagent to measure the oxaloacetate formed by action of the enzyme. (Author)

AD-263 270 Div. 16, 31
(TIPSM/SEB) OTS price $3.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
THERMAL DEGRADATION OF POLYMERIC MATERIALS. II. TOXICITY EVALUATIONS OF SOME GASES EVOLVING FROM EPON 828 + LP 33 COMPOSITE POLYMER,
by M. Honma and E. H. Kawasaki. Aug 61, 38p. incl. illus. tables (Rept. no. LMSC-800894)
(Contract NOrd-17017)
Unclassified report

DESCRIPTORS: (Guided missiles, Materials, Polymers, Epoxides, *Epoxy resins, Sulfides, Decomposition, Pyrolysis, Gases, Poisonous gases.) (*Submarines, Nuclear propulsion, Atmosphere, *Air, Hazards, *Contamination, Gases, *Poisonous gases.) (Dioxides, Sulfur compounds, Carbon compounds, Sulfides, Hydrogen compounds, Hydrocarbons.) Density, Toxicity, *Poison tolerance, Tables, Detection, Chemical analysis, Gravimetric analysis.)

The assessment of a toxicological situation which is the result of the thermal degradation of EPON 828 and LP 33 composite polymer (epoxy-polysulfide) is discussed in terms of the concentration development of the gaseous chemical pyrolyzates. The laboratory apparatus, the pyrolysis procedure, and the analytical techniques are specially designed for chemical identifications and quantitative determinations of the pyrolysis gases in a dynamic air stream. The tabulated and graphical data presented are functions of time and temperature. The distinction between thermal degassing and actual pyrolysis is demonstrated both by chemical analysis and by thermogravimetry which can be used as a quick method to estimate air polution. A toxicological evaluation of SO2, CO2, and H2S originating from the polymer is discussed in relation to the concentration levels for the gases at selected significant time intervals and available threshold limit values for an 8-hour day. The polymer does not present a hazard below 150 C. SO2 and H2S become problematic at 250 C where a definite toxicological trend is established. (Author)

AD-263 342 Div. 16
(TIPSB/LH) OTS price $1.10

Lobund Inst., U. of Notre Dame, Ind.
DESIGN, DEVELOP AND STUDY GERMFREE ISOLATORS FOR USE WITH PATIENTS AND RESEARCH.
Annual progress rept. 1 Sep 60-31 Aug 61,
by P. C. Trexler. 31 Aug 61, 6p.
(Grant no. MEDDH-61-16)
Unclassified report

DESCRIPTORS: (*Germ free animals, Laboratory equipment.)

A series of flexible film isolators have been designed, built and tested on major surgical procedures with large animals. Over 300 pigs and several goats, lambs, dogs and a burro have been delivered germfree in these isolators. A search is being made to find the microbes in the intestinal tract that are responsible for many of the differences between germfree and conventional animals. Clostridium difficile was found to be the only organism among 60 tested that would produce a normal sized cecum in pure culture. (Author)

AD-263 343 Div. 16
(TIPSE/LH) OTS price $1.10

New York Medical Coll., N. Y.
(No title).
Progress rept., 16 Sep 60-31 July 61.
31 July 61, 5p.
(Contracts Nonr-275400 and Nonr-275401)
Unclassified report

DESCRIPTORS: (*Diabetes, *Alloxan, Blood, Cells (Biology), Hemoglobin, Plasma proteins, Tissues (Biology), *Transplantation, Growth, Secretion, Pancreas, Age.)

AD-263 398 Div. 16
(TIPSB/CCH) OTS price $1.10

School of Aerospace Medicine, Brooks Air Force Base, Tex.
RELATIONSHIP OF VENOUS PRESSURE TO INTRAPULMONIC PRESSURE. A COMPARISON OF CONTINUOUS POSITIVE-PRESSURE BREATHING BY MASK AND BY HELMET,
by Louis F. Johnson, Jr. Sep 61, 6p. incl. illus tables (Rept. no. 61-112)
Unclassified report

DESCRIPTORS: (*Blood vessels, *Veins, Blood pressure, Laboratory animals.) (*Pressure breathing, Helmets, Gas masks, Tests, Experimental data, *Respirators.)

A study was made of the relationship of venous pressure to intrapulmonic pressure. During continuous positive-pressure breathing by mask, the superior vena cava pressure rose relatively more than did the jugular venous pressure; thus an unfavorable venous pressure gradient was established for the return of blood from the head to the heart. During continuous positive-pressure breathing by helmet, the jugular venous pressure rose relatively more than did the superior vena cava pressure; thus a favorable venous pressure gradient was established for the return of blood from the head to the heart. From the standpoint of pressure gradients, venous return from the head to the heart was more favorable when pressure-breathing by helmet than when pressure-breathing by mask. (Author)

AD-263 464 Div. 16
(TIPSB/CDW) OTS price $1.10

Science and Tech. Section, Air Information Div., Washington, D. C.
ANTIRADIATION AGENT.
30 Aug 61, 1p. (AID rept. no. 61-129; Trans. from Tsigerol. Meditsinskiy rabotnik, p. 3, 18 Aug 61)
Unclassified report

DESCRIPTORS: *Radioprotective drugs, USSR.

AD-263 666 Div. 16
(TIPSB/CDW) OTS price $1.10

Science and Tech. Section, Air Information Div., Washington, D. C.
SOVIET DEVELOPMENT OF SPACE BIOLOGY.
10 Aug 61, 2p. incl. table (AID rept. 61-119; Trans. of General Meeting of the Academy of Sciences USSR. Biological Problems of Space Flights. Akademiya Nauk SSSR. Vestnik 6:31-40, May 61)
Unclassified report

DESCRIPTORS: (*Space medicine, Space flight, *USSR, Closed cycle ecological system.) (Planets, Biology.) (Radiation injuries, Control, Radioprotective drugs.)

AD-263 670 Div. 16
(TIPSB/MS) OTS price $2.60

Science and Tech. Section, Air Information Div., Washington, D. C.
SOVIET LITERATURE ON LIFE SUPPORT SYSTEMS.
Monthly rept. no. 5, July-Aug 61.
25 Aug 61, 20p. incl. illus. tables, 13 refs. (AID rept. 61-125)
Unclassified report

DESCRIPTORS: *Space medicine, *Closed cycle ecological systems, Space flight, Radiobiology, Instrumentation, Psychology, Physiology, Biology, Metabolism, *USSR.

This is the fifth in a report series reviewing Soviet developments in life support systems as reflected in Soviet publications. Items are selected from Soviet open literature and include scientific publications and literature of a popular type. The materials in this report deal with the following topics: space medicine and biology, space vehicle ecology, and instrumentation. (Author)

AD-263 875 Div. 16, 1
(TIPSB/CW) OTS price $1.60

Bell Helicopter Corp., Fort Worth, Tex.
A STUDY OF THE EFFECTS OF MONOCULAR VISION ON HOVERING PERFORMANCE.
Technical data rept. on ANIP. Army-Navy Instrumentation Program,
by Lowell E. Wilkerson and W. G. Matheny.
Sep 61, 13p. incl. illus. tables (Rept. no. D228-421-007)
(Contract Nonr-167000)
Unclassified report

DESCRIPTORS: (*Vision, *Visual perception, *Space perception, Military personnel.) (*Helicopters, *Display systems, Control systems, Flight, Stability, Maintenance.)

A basic assumption underlying a contact analog display is that such a display will transmit information to the pilot in a manner which embodies the necessary and sufficient cues resident in the real world. Most pilots receive this information from a stimulus complex based upon experience of binocular vision. However, when presenting information in an analog form on a display within the cockpit, the necessary three-dimensional information must currently be presented on a two-dimensional surface. This restricts the observer to monocular cues for judging depth and distance. This experiment was designed to compare the performances of experienced helicopter pilots in hovering the helicopter on contact under conditions of binocular and monocular vision. It further compared these performances under two sizes of viewing area - full contact visibility and an 8 x 8 in. viewing port. Hovering data were collected on eight United States Army helicopter trainees having 35 to 40 hr fixed-wing time and an average of 80 hr helicopter time. The parameters recorded were altitude, lateral and fore and aft translation. The data were reduced to a constant error statistic and a variability statistic. (Author)

AD-263 886 Div. 16
(TIPSB/LH) OTS price $6.60

Biotechnology Lab., U. of Calif., Los Angeles.
ARM PROSTHESIS RESEARCH. OBSERVER PRACTICE. HUMAN THERMAL STUDIES. HUMAN TRACKING.
Progress rept. for period ending 15 June 61,
by John Lyman. 15 June 61, 55p. incl. illus. (Rept. no. 61-49)
(Contracts V1005M-2075, Nonr-23349, AF 33(616) 6763 and N123(60530)23558A)
Unclassified report

DESCRIPTORS: (Artificial limbs, *Prosthetics, Hands, Electromechanical converters, Man.) (*Heat tolerance, Physiology.) Muscles, Control, Training, (*Tracking, Behavior, Test methods, Television display systems.)

17. METALLURGY

AD-263 125 Div. 17
(TIPSM/BRW) OTS price $1.00

Naval Research Lab., Washington, D. C.
FURTHER WORK ON THE ZINC-BASE COATING FOR NIOBIUM.
Progress rept. no. 3; on Protection of Refractory Metals for High Temperature Service,
by G. Sandoz, R. A. Meussner and others.
31 July 61, 35p. incl. illus. tables (NRL rept. no. 5620)

Unclassified report

DESCRIPTORS: (*Niobium, Coatings, Zinc coatings, Niobium alloys, Titanium alloys, Oxidation, Diffusion.) (*Niobium compounds, *Zinc compounds, Phase studies, Intermetallic compounds, Purification.) (*Zinc coatings, Vapor platings, Life expectancy, Thickness, Zinc alloys, Additives, Aluminum alloys, Titanium alloys, Tantalum alloys, Molybdenum alloys, Lithium, Calcium, Phosphorus, Nickel compounds, Aluminum compounds, Manganese, Zirconium.)

Contents:
The niobium-zinc phase diagram (R. A. Meussner and R. J. Goode)
Studies of vapor deposited coatings of zinc on niobium (G. Sandoz, T. C. Lupton, R. J. Hicks)
Studies of the effect of alloying elements on the zinc-base coating for niobium (G. Sandoz and R. L. Newbegin)
Niobium-titanium-zinc coatings and solid solution alloys (J. Stoop)
The oxidation of alloys containing zinc in solid solution (R. A. Meussner and R. J. Goode)
Oxidation behavior of ternary niobium-transition metal-zinc systems (J. Smith and S. W. Strauss)
The preparation of niobium specimens containing carbides (A. J. Pollard)
The removal of interstitial impurities from niobium by the zinc-niobium compounds (R. A. Meussner, R. J. Goode, and A. J. Pollard)

AD-263 128 Div. 17, 25
(TIPSM/BRW) OTS price $1.60

Watertown Arsenal Labs., Mass.
ON THE CONSEQUENCES OF A MODEL FOR THE EFFECT OF THICKNESS ON FRACTURE TOUGHNESS AS APPLIED TO LAMINATED STRUCTURES.
Rept. on Basic Ordnance Research,
by Joseph I. Bluhm. Aug 61, 11p. incl. illus. (Technical rept. no. WAL TR 834.2/6)

Unclassified report

DESCRIPTORS: (*Fracture (Mechanics), Metals, Sheets, Laminates, Thickness, Impact shock, Energy, Absorption, Mathematical analysis.)

A model previously suggested for predicting the fracture behavior of thin sheet is extended to cover laminated composites. Thus extended, this model leads to a prediction of the behavior of laminated Charpy bars which is at least qualitatively substantiated by the observed behavior. (Author)

AD-263 164 Div. 17
(TIPSM/BRW) OTS price $.50

Defense Metals Information Center, Columbus, Ohio.
INVESTIGATION OF DELAYED-CRACKING PHENOMENON IN HYDROGENATED UNALLOYED TITANIUM,
by R. A. Wood, D. N. Williams, and H. R. Ogden, 30 Aug 61, 18p. incl. illus. tables, 118 refs. (DMIC memo. no. 124)

Unclassified report

DESCRIPTORS: (*Titanium, Sheets, Welds, Fracture (Mechanics), Aging, Impurities, Oxygen, Nitrogen, Hydrogen embrittlement, Stresses, Rupture, Tensile properties, Impact shock, Tests, Metallurgical analysis, Microstructure.)

Three grades of unalloyed titanium were studied to determine the effect of variations in O and N contents on delayed cracking. The bar stock was analyzed for interstitial content, then vacuum annealed to remove most of the H. Large samples of the 1/2-in.-diam vaccum-annealed stock were subsequently hydrogenated to about 90 and 160 ppm H levels. Hydrogen-induced strain-aging embrittlement at ambient temperatures in interstitial-containing alphi Ti was not indicated by the results of stress-rupture tests. The results indicate that strain-aging embrittlement does not occur in unalloyed Ti having up to 0.38 wt-% O with as much as 160 ppm H content. However, a noticable effect of H on notch sensitivity of the materials, in the alpha-annealed and especially in the beta-annealed conditions, was observed. It appears probable that H was concentrated in the critical areas by a thermal-diffusion process to create an ultrasensitive zone. Failure might have occurred subsequently as a result of simple overstressing, or by accidentally applied impact stresses, or by a more complicated low-cycle fatigue mechanism. (Author)

AD-263 167 Div. 17, 26
(TIPSM/BRW) OTS price $.50

Defense Metals Information Center, Columbus, Ohio.
A REVIEW OF RECENT DEVELOPMENTS IN TITANIUM AND TITANIUM ALLOY TECHNOLOGY.
Rept. for June-Aug 61,
by R. A. Wood. 15 Sep 61, 6p. incl. table, 18 refs. (DMIC memo. no. 126)

Unclassified report

DESCRIPTORS: (*Titanium, *Titanium alloys, Aluminum alloys, Chromium alloys, Molybdenum alloys, Tin alloys, Vanadium alloys, Zirconium alloys, Military research, Industrial research, Sheets, Rolling mills, Production, Processing, Manufacturing methods, Mechanical properties, Airframes, Rocket cases, Design.)

The memorandum reviews selected information on new developments in titanium metallurgy from June through August, 1961. Major interest was centered around the Ti-13V-11Cr-3Al all-beta alloy and the Ti-8Al-1Mo-1V, Ti-7Al-12Zr, and Ti-5Al-5Sn-5Zr super alpha alloys. Other Ti-alloy grades, particularly those in the DOD sheet rolling program, still receive a large proportion of the research effort. Researches toward improving the fabrication, joining, and forming processes generally utilize these alloys. Very little information on the development of new Ti-alloy compositions is available. (Author)

AD-263 181 Div. 17
(TIPSM/EET) OTS price $2.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
THERMAL RESISTANCE OF METAL-TO-METAL CONTACTS: AN ANNOTATED BIBLIOGRAPHY,
by Robert C. Gex, July 61, 20p. (Special Bibliography no. SB-61-39; 3-34-61-6)
(Contract AF 04(647)673)

Unclassified report

DESCRIPTORS: (*Metal joints, *Welded joints, *Bonded joints, *Riveted joints, *Thermal conductivity, *Heat transfer.) (Airframes, Aircraft, Structures, Thermal stresses, Materials.) *Bibliography.

Forty-four annotated references on heat transfer through metallic contacts are included. Emphasis is placed on thermal contact resistance in a vacuum. Welded and bonded joints are not included. Most of the information abstracted relates to the technologies of aircraft structural design and nuclear reactor design. The literature sources used were: (1) Applied Mechanics Reviews (1948-1961), (2) Engineering Index (1940-1961), (3) NASA & NACA indices (1950-1961), (4) Nuclear Science abstracts (1951-1961), and (5) Lockheed Missiles & Space Co. (Author)

AD-263 183 Div. 17
(TIPSM/EET) OTS price $9.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
PROPERTIES OF BETA TITANIUM, TITANIUM-VANADIUM, AND TITANIUM-ALUMINUM ALLOYS, AN ANNOTATED BIBLIOGRAPHY,
comp. by Helen M. Abbott. June 61, 115p. (Special bibliography no. SB-61-31; 3-80-61-4)
(Contract NOrd-17017)
Unclassified report

DESCRIPTORS: (*Bibliography, *Titanium, *Titanium alloys, Vanadium alloys, Chromium alloys, Aluminum alloys.) (Phase transitions, Phase studies, Transformations, Hydrogen embrittlement.) (Processing, Manufacturing methods, Machining, Extrusion, Welding, Forging, Powder metallurgy, Rolling mills.) (Physical properties, Mechanical properties, Impact shock, Tensile properties, Elasticity, Hardness, Heat treatment, Stresses, Temperature.)

A bibliography is presented that contains a collection of references on the properties and characteristics of beta Ti alloys, including B-120VCA, Ti-13V-11Cr-3Al, Ti-6Al-4V and other principal Ti-V, Ti-Al alloys. The following sources were used during the search: (1) LMSD card catalog and book collection, (2) Technical Abstract Bulletins (1961 - 1958), (3) Nuclear Science Abstracts (1960 - 1958), (4) ASM Review of Metal Literature (1960 - 1958), and (5) Crerar Metals Abstracts (1961 - 1958). (Author)

AD-263 231 Div. 17
(TIPSM/BRW) OTS price $1.00

Watertown Arsenal Labs., Mass.
AUSTEMPERED-AND-RETEMPERED VERSUS QUENCHED-AND-TEMPERED STEEL AT HIGH YIELD STRENGTH LEVELS,
by S. V. Arnold. July 61, 37p. incl. illus. tables (Technical rept. no. WAL TR 320.1/3)
Unclassified report

DESCRIPTORS: (*Steel, *Tool steel, Heat treatment, Tensile properties, Mechanical properties, Impact shock, Phase transitions, Austenite, Bainite, Martensite.)

Tensile properties, including notched tensile and sustained notched tensile strength, and impact transition behavior of a 0.60%-C Si-rich tool steel were determined at 220 ksi and 245 ksi yield strength levels in order to compare effects of austemper-and-retemper heat treatment practice with those of conventional quench-and-temper practice. At the 220 ksi yield strength level, no appreciable difference in properties was obtained for either heat treatment. At the 245 ksi yield strength level, ductility and notched tensile strength were comparable, but austempered-and-retempered steel differed from the quenched-and-tempered in two respects: (1) the former practice engendered not only a higher Charpy impact energy for ductile fracture but also a higher transition temperature; (2) the former practice induced substantially higher strength (275 vs 225 ksi for 150 hours duration in the presence of a K sub t equals 6.3 notch). (Author)

AD-263 272 Div. 17
(TIPSM/BRW) OTS price $9.10

Lockheed Aircraft Corp., Sunnyvale, Calif.
BERYLLIUM, A SURVEY OF THE LITERATURE,
by Jack B. Goldmann. June 61, 106p. 215 refs.
(Special Bibliography no. SB-61-35; Rept. no. 3-80-61-6)
(Contract NOrd-17017)
Unclassified report

DESCRIPTORS: (*Bibliography, *Beryllium, Beryllium alloys, Beryllium compounds, Intermetallic compounds, Chemical analysis, X-ray spectroscopy, Hazards, Oxides, Reaction kinetics, Spectrographic analysis, Processing, Purification, Zone melting, Manufacturing methods, Casting, Extrusion, Forging, Drawing (Machine processing), Powder metallurgy, Sintering, Coatings, Electroplating, Welding, Electron beams, Machining, Joints, Pickling, Mechanical properties, Fracture (Mechanics), Metal joints.)

An annotated bibliography of Be and Be alloys is presented for publications released during the first quarter of 1961. Citations are arranged alphabetically by author under broad subject headings of Alloys; Analysis; Applications; Bibliographies; Compounds; Fabrication Techniques; Hazards; Joining; Oxides; Powder Metallurgy and Casting; Processing; Properties; and Miscellaneous. The following sources were surveyed: ASM Review of Metal Literature; ASTIA TAB; Abstracts Journal of Metallurgy, Parts A and B, (USSR); Acta Crystallographica; Battelle Technical Review; Chemical Abstracts; Crerar Metals Abstracts; Defense Metals Information Center; Engineering Index; Journal of Less Common Metals; Metallurgical Abstracts (Institute of Metals); Nuclear Engineering Abstracts; Nuclear Science Abstracts; Radiation Effects Information Center; Science Abstracts, A: Physics; Soviet Journal of Non-Ferrous Metals; Soviet Physics-Crystallography; Soviet Science in Translation; and U. S. Government Research Reports. (Author)

AD-263 598 Div. 17
(TIPSM/BRW) OTS price $3.00

Defense Metals Information Center, Columbus, Ohio.
OXIDATION OF TUNGSTEN,
by V. D. Barth and G. W. P. Rengstorff.
17 July 61, 177p. incl. illus. tables, 186 refs.
(DMIC rept. no. 155)
(Contract AF 33(616)7747)
Unclassified report

DESCRIPTORS: (*Tungsten, *Tungsten alloys, *Oxidation, Oxygen, Tungsten compounds, Oxides, Stability, Reaction kinetics, Theory, Temperature, Pressure, Water vapor, Coatings, Refractory coatings, Ceramic coatings, Metal coatings, Silicides, Bibliography.)

The report presents a detailed review of available information on the oxidation of W and its alloys. W is relatively inert below 700 C. As the temperature is increased above this level, however, oxidation becomes progressively more rapid, reaching catastrophic rates at temperatures around 1200 C and above. Various theories for the mechanism and rates of W oxidation at different temperatures are reviewed, and the effect of pressure and water vapor on the stability of W oxides is discussed in detail. The elevated-temperature reactions of W with other materials, such as refractory oxides, and with gases other than oxygen also are covered. Information on the protection of W by alloying and coating is included. (Author)

AD-263 663 Div. 17, 26
(TIPSM/BRW) OTS price $1.10

Science and Tech. Section, Air Information Div., Washington, D. C.
SQUEEZE CASTING.
1 Aug 61, 2p. incl. illus. (AID rept. 61-114; Trans. from Squeeze Casting; its Hydrodynamic Principles; Moskovskiy Aviatsionnyy Tekhnologicheskiy Institut. Voprosy Tekhnologii Liteynogo Proizvodstva. Questions of Technology in Founding Industry. Trudy 49, Moskva, Oborongiz:24-46, 1961)
Unclassified report

DESCRIPTORS: Metals, *Casting, Hydraulic presses, Machines, Hydrostatic pressure, USSR, Translations, Hydrodynamics.

Squeeze casting is a method of producing large thin-walled castings by (1) the formation of a thin metal crust on the walls of the mold halves, and (2) the formation of the casting by joining the two crusts together and squeezing out the excess metal. The squeeze-casting machine consists of 2 jaws, a stationary jaw carrying a mold plate and sand core, and a movable jaw with mold plate, carrying a die and side lips to prevent runout of the metal. The stationary jaw is supported by a bracket, and the movable jaw is hinged to the base frame. Hydrodynamic properties of squeeze casting promote the removal of gases and solid impurities from the metal, thus providing higher strength and ductility of the casting walls than is the case for other casting methods. Squeeze-cast panels have a smooth, clean surface and high dimensional accuracy, so that they require little machining. (Author)

AD-263 678 Div. 17
(TIPSM/BRW) OTS price $1.10

Armour Research Foundation, Chicago, Ill.
DEVELOPMENT OF DUCTILE BERYLLIUM COMPOSITES.
Bimonthly rept. no. 4, 18 July-17 Sep 61, by Frank A. Crossley. 17 Sep 61, 6p. incl. illus. tables (Rept. no. ARF 2212-4)
(Contract NOw 61-0370-c)
Unclassified report

DESCRIPTORS: (Beryllium, *Beryllium alloys, *Powder alloys, Silver alloys, Aluminum alloys, Powder metals, Powder metallurgy, Sintering, Pressure, Heat treatment, Mechanical properties, Physical properties, Porosity, Density, Hardness.)

Progress is reported on the development of ductile Be composites consisting of Be particles in a ductile matrix. The vacuum chamber is now in operation. This chamber will permit pressure liquid-phase sintering in vacuum. It is hoped that this will answer the porosity problem. Tensile tests and hardness evaluations of heat-treated binary alloys spanning the Ag-Al system indicate that the correct matrix can be found which satisfies the strength and ductility requirements for the attainment of ductile beryllium composites. (Author)

AD-263 679 Div. 17
(TIPSM/EET) OTS price $1.60

Armour Research Foundation, Chicago, Ill.
FIBER-REINFORCED METALS AND ALLOYS.
Bimonthly rept. no. 2, 19 June-18 Aug 61, by T. J. Koppenaal and N. M. Parikh. 28 Aug 61, 4p. illus. (Rept. no. ARF 2221-2)
(Contract NOw 61-0555-c)
Unclassified report

DESCRIPTORS: (*Silver, Reinforcing materials, Metallic textiles, Fibers, Wire, Steel, Stainless steel, Molybdenum, Mechanical properties, Physical properties, Heat treatment, Deformation, Hardness.)

Examination of the slip line structure of 30% density composite with an Ag matrix and fibers of mild steel, Mo, and heat treated-type-410 stainless steel after 4% elongation showed no slip lines in the stainless steel fibers, but large amounts of deformation in the mild steel fibers. Specimens were prepared from (1) as-impregnated, (2) reduced 30% and recrystallized, (3) reduced 60% and recrystallized, and (4) reduced 90% and recrystallized Ag matrix composites, respectively. The composites were prepared from 0.001-in.-diam type 430 stainless steel (SS) fibers (35% density), 0.0005-in.-diam type 430 SS fibers (50% density), 20-micron-diam type 304 SS fibers (15% density), and 0.001-in.-diam Fe-20% Cr-10% Al alloy fibers 15% density). The strength properties increased rapidly with reduction in area, and the elongation decreased. Recrystallization (2 hr at 500 C) decreased the strength and increased elongation, but the strength of the composites (recrystallized) increased with prior reduction in area. The interfiber spacings were 0.0040, 0.0026, 0.0025, and 0.0021 in. for the as-impregnated, 30, 60, and 90% reduction in area condition, respectively. The density of the composites increased with the amount of rolling.

AD-263 765 Div. 17
(TIPSM/EET) OTS price $.75

National Aeronautics and Space Administration, Washington, D. C.
EFFECTS OF CHANGING STRESS AMPLITUDE ON THE RATE OF FATIGUE-CRACK PROPAGATION IN TWO ALUMINUM ALLOYS,
by C. Michael Hudson and Herbert F. Hardrath. Sep 61, 24p. incl. illus. tables (Technical note no. D-960)
Unclassified report

Also available from NASA, Wash. 25, D. C., as NASA Technical note no. D-960.

DESCRIPTORS: (Sheets, *Aluminum alloys, Fatigue (Mechanics), Fracture (Mechanics), Stresses, Load distribution, Tensile properties, Mechanical properties, Test methods, Tests.) (Airframes, Design.)

A series of fatigue tests with specimens subjected to constant-amplitude and two-step axial loads were conducted on 12-in. wide sheet specimens of 2024-T3 and 7075-T6 aluminum alloy to

study the effects of a change in stress level on fatigue-crack propagation. Comparison of the results of the tests in which the specimens were tested at first a high and then a low stress level with those of the constant-stress-amplitude tests indicated that crack propagation was generally delayed after the transition to the lower stress level. In the tests in which the specimens were tested at first a low and then a high stress level, crack propagation continued at the expected rate after the change in stress levels. (Author)

AD-263 814 Div. 17, 14
(TIPSM/EET) OTS price $3.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
DEVELOPMENT OF COMPOSITE STRUCTURAL MATERIALS FOR HIGH TEMPERATURE APPLICATIONS.
Progress rept. no. 5, 1 May-31 Aug 61, on Materials Studies Operation,
by W. H. Sutton, A. Talento, and J. Chorne.
Aug 61, 30p. incl. illus. table, 10 refs.
(Contract NOw-60-0465-d)
Unclassified report

DESCRIPTORS: (High temperature research, *Silver, Reinforcing materials, Ceramic fibers, Sapphires, Aluminum compounds, Oxides, Crystals, Growth, Synthesis.) (Silver wire, Processing, Casting, Tensile properties, Mechanical properties.)

Studies were made of the feasibility of making whisher-reinforcement of metal composites for structural applications. The ultimate goal is a composite with a strength-to-density ratio of 600,000 in. at 2000 F. The growth of sapphire (Al2O3) whiskers was optimized to produce length-to-diam ratios of 1000 or better. Studies are underway to improve the wettability and adherence between the sapphire whiskers and silver matrix. Wire specimens of silver, 0.030 in. in diam and reinforced with Al2O3 whiskers, were fabricated by centrifugal casting methods. This method yields composites of nearly 100% density, and results in greatly improved penetration of the silver into the whisker bundles, even though the latter were not metallized. (Author)

AD-263 888 Div. 17
(TIPSM/EET) OTS price $.50

Defense Metals Information Center, Columbus, Ohio.
REVIEW OF RECENT DEVELOPMENTS IN THE TECHNOLOGY OF TUNGSTEN.
Memorandum rept. May-Aug 61,
by V. D. Barth. 22 Sep 61, 7p. 16 refs. (DMIC Memorandum rept. no. 127)
Unclassified report

DESCRIPTORS: (*Tungsten, *Tungsten alloys, Processing, Flame spraying, Electric arcs, Plasma jets, Forging, Bonding, Pressure, Gases, Explosive forming, Casting, Rolling mills, Extrusion, Melting, Electron beams, Powder metallurgy, Sintering, Oxidation, Coatings, Ceramic coatings, Silicides, Chemical reactions, Carbides, Borides, Nitrides, Sheets, Thin films, Porous metals, Rocket motor nozzles, Ion sources.)

Contents:
Consolidation and fabrication
Oxidation and protection
Properties

AD-263 898 Div. 17, 25
(TIPSM/BRW) OTS price $2.60

Illinois U., Urbana.
AUSTENITE-MARTENSITE CRYSTALLOGRAPHY IN Fe-1.51C-3.09Cr,
by K. A. Johnson and C. M. Wayman. 1961, 24p. incl. illus. table, 18 refs.
(Contract AF 49(638)420)
(AFOSR-1309) Unclassified report

DESCRIPTORS: (*Iron alloys, Chromium alloys, Carbon alloys, Crystal structure, Phase transitions, Transformations, Austenite, Martensite, Lattices, Deformation, Theory, Tests, X-ray diffraction analysis, Mathematical analysis, Digital computers.)

Conclusions: An alloy of Fe-1.51%C-3.09%Cr undergoes an austenite-martensite transformation at -14C. The lattice parameters of the austenite and martensite, the lattice orientation relationship, and the habit plane for this transformation were experimentally determined. An analysis of the crystallography on the basis of the Wechsler-Lieberman-Read (Trans. AIME, 197:1503, 1953) and Bowles-Mackenzie (Acta. Met. 2:129, 138, 224, 1954) theories showed that the experimental quantities could not be accounted for completely by either theory. Better agreement may be possible by incorporating an anisotropic dilation into the austenite-martensite interface. This more general theory is under consideration at present. (Author)

18. MILITARY SCIENCES AND OPERATIONS

AD-263 400 Div. 18, 13, 11
(TIPSE/CRJ) OTS price $1.10

Hughes Aircraft Co., Fullerton, Calif.
FEASIBILITY AND DESIGN STUDY FOR COLLECTIVE PROTECTION EQUIPMENT FOR THE AN/MSG-4 SYSTEM.
Monthly progress rept. 1 July-1 Aug 61,
by K. M. Spradlin. 21 Aug 61, 5p. incl. tables.
(GSG rept. no. 1610.30/141; SD 61-137)
(Contract DA 18-108-cml-6618)
Unclassified report

DESCRIPTORS: (*Antiaircraft defense systems, *Radar trailers, *Trailers, Portable shelters, *Air intake filters, *Air conditioning equipment.) (*Air intake filters, Gases, Aerosols, Reduction.) (*Air intake filters, *Air conditioning equipment, Design.) (Air conditioning equipment, Pressure regulators, Design.)

Research is concerned with the feasibility of installing collective protection (air filtration) equipment on semitrailer vans, trucks, and air transportable shelters that contain the various subsystems of the AN/MSG-4 Antiaircraft Defense System. The collective protection equipment will include: a chemical, bacteriological, and radiological (CBR) filter for filtering irritating, noxious, and toxic gases and aerosols from the air; a pressure-control device to maintain minimum pressure of the air conditioning system; and an air lock that permits personnel to make safe entry and exit from the various vehicles and shelters. Mockups of proposed CBR filters and a mockup of a protective entrance will be fabricated following completion of the initial phase of the feasibility study. (Author)

Division 19 - NAVIGATION
Division 20 - NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

AD-263 543 Div. 18, 28, 6, 8
(TIPSE/CRJ) OTS price $11.50

HRB-Singer, Inc., State College, Pa.
DISPLAY PROBLEMS IN AEROSPACE SURVEILLANCE SYSTEMS. PART I. A SURVEY OF DISPLAY HARDWARE AND ANALYSIS OF RELEVANT PSYCHOLOGICAL VARIABLES, by Lloyd Crumley, Richard Divany and others. 30 June 61, 257p. incl. illus. 348 refs. (Rept. no. 256-R-2, pt. 1)
(Contract AF 19(604)7368)
(ESD TR-61-33) Unclassified report

DESCRIPTORS: (*Display systems, Colors, Human engineering, Cathode ray tubes, Brightness.) (Aerial targets, Detection.) (Data processing systems, Data transmission systems, Data storage systems.) (Psychology, Visual acuity, Sensory perception.) (Recording devices, Plastics.) *Antiaircraft defense systems, Photographic recording systems.

Research concerns determination of the information presentation requirements of human data processing roles in future air and aerospace surveillance systems. Display parameters and operator characteristics which are relevant to display selection are described, and reviews of some of the pertinent literature are presented. The description and specification of operator roles is also included; these roles are based upon a conceptual model of future air and aerospace surveillance system and a review of the state of the art in displays. (Author)

AD-263 549 Div. 18, 32
(TIPSB/CDW) OTS price $1.60

Army Artillery and Missile School, Fort Sill, Okla.
JUNGLE WARFARE. AN ANNOTATED BIBLIOGRAPHY. Sep 61, 16p. 156 refs. (Special bibliography no. 28)
Unclassified report

DESCRIPTORS: *Warfare, Tropical regions, *Bibliography, *Jungles.

19. NAVIGATION

AD-263 385 Div. 19
(TIPSE/NTM) OTS price $10.50

Aeronautical Structures Lab., Naval Air Material Center, Philadelphia, Pa.
STATISTICAL PRESENTATION OF FLEET OPERATIONAL LANDING PARAMETERS FOR MODELS F8U-1, F9F-8P, F3H-2N, A4D-1 AND A3D-2 AIRCRAFT ABOARD THE USS SARATOGA (CVA-60) IN THE MEDITERRANEAN SEA AREA, by S. A. Markowitz and F. G. Negro. 31 Aug 61, 138p. incl. illus. tables (Rept. no. NAMATCEN-ASL-1035)
(Problem Assignment 1-22-1)
Unclassified report

DESCRIPTORS: (Aircraft carriers, Landing, *Carrier landings, *Airplane landings, Shipborne.) (Landing aids, Doppler radar, Radar navigation, Radar equipment.) (Fleets, *Naval operations, Jet fighters, Jet planes, Attack bombers.)

The first aircraft approach and landing data are presented for normal fleet operations with qualified carrier air groups flying the models F8U-1, F3H-2N, F9F-8P, A3D-2, and A4D-1 aircraft. The data were derived from film records photographed aboard the USS SARATOGA during Mediterranean Sea maneuvers in June 1958. The aircraft landing and approach parameters were obtained from film records through a technique developed by the Aeronautical Structures Laboratory (ASL), use of the ship's logs, AN/SPN-12 doppler radar and point readings of the Mark 19 gyro compass indicator dial for carrier deck pitch and roll angle. The parameters included in this report are approach speed, wind velocity over the deck, engaging speed, sinking speed, wing lift factor, aircraft pitch and roll angle, aircraft wheel and hook height above the carrier ramp, landing weight, aircraft centerline off-center distance, distance from ramp to first main wheel touchdown, glide path angle, arrestment wire engaged, and the carrier deck pitch and roll angles. (Author)

AD-263 820 Div. 19, 16
(TIPSE/JAB) OTS price $8.60

Advanced Electronics Center, General Electric Co., Ithaca, N. Y.
VISUAL FACTORS IN THE CONTACT ANALOG. Summary rept. for 1961. 1961, 92p. incl. illus. tables, 13 refs.
(Subcontract to Douglas Aircraft Co., El Segundo, Calif., Contract Nonr-107600)
Unclassified report

DESCRIPTORS: (*Display systems, Airborne, *Flight instruments, *Navigation, Vision, Visual perception, Flight paths, Analog systems.)

A summary is presented of what is known and not known about visual factors in the contact analog flight display. The review is an attempt to call attention to existing criteria for making such decisions insofar as they depend on pilot perceptual factors and indicate whether such criteria rest on empirical, rational, or intuitive grounds. The style is discursive and the content speculative rather than conservative for it is felt that this is the only way that will permit a full discussion of the problem. The discussion is the synopsis of a process lasting from 1954 to the present. A version of the contact analog pilot display is shown. The broad checkered surface is a flat horizontal surface, like the ground. The ladder-like ribbon represents the command path for the pilot -- the director highway down which he should be flying. The circular objects represent flat objects lying in a cloud-like plane. All of these surfaces respond to all degrees of freedom of motion of the aircraft and when the aircraft is in motion, it is as though the pilot were looking out at a world of checkered earth, ladder-like highways and flat circular clouds. (Author)

20. NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

AD-263 145 Div. 20, 6
(TIPSP/JSM) OTS price $2.60

Advanced Research Projects Agency, Washington, D. C.
PROJECT VELA. PROCEEDINGS OF SYMPOSIUM (ADDENDUM)

20 July 61, 36p. incl. illus. (Addendum to AD-253 702)

Unclassified report

DESCRIPTORS: (*Nuclear explosions, *Detection, Symposia.) Underground explosions, Research program administration.

Contents:
DASA's (Defense Atomic Support Agency) responsibility and organization for testing, by P. G. Galentine
The problem of on-site explosion inspection, by Robert Scheid: The criteria are reviewed for inspection of events and their possible locations; the characteristics of clandestine tests that are of interest; inspection procedures; and the research planned on the various techniques.

AD-263 350 Div. 20, 12
(TIPSM/BRW) OTS price $3.60

AVCO Research Lab., Everett, Mass.
RADIATION SHIELDING OF SPACE VEHICLES BY MEANS OF SUPERCONDUCTING COILS,
by Richard H. Levy. Apr 61, 37p. incl. illus. 25 refs. (Research rept. no. 106)
(Contract AF 04(647)278)
(AFBSD TN 61-7) Unclassified report

DESCRIPTORS: (Manned, *Spaceships, Shielding, Electromagnetic shielding, Space environmental conditions, Magnetic fields, Superconductivity, *Coils, Analysis, Mathematical analysis.) (Space flight, Hazards, Radiation effects, Protons, Ions, Sources, Van Allen radiation belt, Solar flares, Cosmic rays, Dose rate.)

The general problem of shielding the occupants of manned space vehicles from various radiations likely to be encountered in space flight is discussed, and various published papers on the subject are briefly reviewed. The review indicates the importance of the problem and the interest that would attach to a radical solution. One possibility is shielding by the permanent magnetic field of a superconducting coil. A detailed analysis is made of the shielding that could be provided by such a coil and a preliminary estimate of the weight of such a device is made paying particular attention to the weight of the structure required to support the coil. A comparison is made of the weights calculated in this way with the weight of the spherical H2O shield which would give comparable protection. (Author)

AD-263 430 Div. 20, 2
(TIPSP/GRW) OTS price $1.60

Naval Research Lab., Washington, D. C.
ATMOSPHERIC RADIOACTIVITY AT KODIAK AND WALES, ALASKA,
by L. B. Lockhart, Jr. 11 Aug 61, 16p. incl. illus. tables (NRL rept. no. 5658)
Unclassified report

DESCRIPTORS: (*Atmosphere, *Radioactivity, Nuclear explosions, Detection.) (Precipitation, Radioactive fall-out, Periodic variations, *Radiological dosage, Climatic factors.) (Fission product activity, Tables, Alaska.)

The concentrations of radioactivity in the air in Alaska are documented from data collected by NRL air-monitor equipment operated at Kodiak (1950-1960) and Wales (1953-1959). Seasonal variations in the short-lived natural radioactive components of the air are observed at both sites while variations in the fission product concentration are directly related to periods of nuclear testing, particularly by the Soviet Union. Concentrations of both natural and fission product activities are generally much lower than those found along the eastern seaboard of the United States. The possible use of thorium B as a tracer for short-term atmospheric processes is pointed out. (Author)

AD-263 520 Div. 20, 16
(TIPSP/WH) OTS price $1.60

Air Force Special Weapons Center, Kirtland Air Force Base, N. Mex.
MAXIMUM PERMISSIBLE ACTIVITY (MPA) OF FISSION PRODUCTS IN AIR AND WATER VERSUS THE AGE OF THE PRODUCTS,
by Donald L. Summers, Marvin C. Gaske, and James L. Dick. Dec 58, 19p. incl. tables (Rept. no. AFSWC TN 58-30)
(Proj. no. 7806)
Unclassified report

DESCRIPTORS: (*Fission product activity, Fission products, Air, Water, Contamination.) (*Radiation hazards, *Dose rate, Dosage, Fission, Numerical methods and procedures.) (Isotopes, Uranium.)

In order to provide a simple method of evaluating the internal radiation hazard, the MPA's for ideal mixtures of fission products versus their ages were calculated and plotted. The resulting curves show that the MPA's change appreciably with time. Between one day and three years they decrease from 20,000 to 90 dpm/cubic meter (disintegration per minute) for air, and from 1.2 x 10 to the 8th power to 1.2 x 10 to the 6th power dpm/cubic meter for water. From the curves a first approximation of the MPA's, and therefore the hazard from fission product activity in air and water, can be obtained. In order to use the curves, one needs to know only the disintegration rate per unit volume and the age of the products. (Author)

AD-263 667 Div. 20, 8, 2
(TIPSP/MFA) OTS price $1.60

Science and Tech. Section, Air Information Div., Washington, D. C.
SOVIET NUCLEAR INSTRUMENTATION AND CONTROL FOR PROPULSION.
Monthly rept. no. 6, 10 May-10 July 61.
15 Aug 61, 11p. incl. illus. table (AID rept. 61-120)
Unclassified report

DESCRIPTORS: (*Nuclear physics laboratories, *Nuclear propulsion, Radiation instruments.) (*Gamma rays, Gamma neutron reactions, Gamma ray spectrometers.) (Scintillation counters, Time interval counters.) (Count rate meters, *Pulse discriminators, Pulse amplifiers, Pulse analyzers.) (*Valves, *Cloud chambers, Electrodes, Metals, *Capacitors, Electric discharges.) (*Ionization chambers, *Electromagnetic shielding, *Pressure capsules, Argon, Electrodes, Voltage.) (*Cloud chambers, Pressure regulators, Design.) (*Nuclear power plants, *Reactor cores, Transducers, Gamma emission.) (*Neutron spectrum, *Graphite-moderated reactors, Gases, High-temperature research.) *USSR.

Division 21 - NUCLEAR PROPULSION
Division 22 - ORDNANCE

A collection of Soviet papers on nuclear instrumentation and control for propulsion is reviewed: (1) gamma spectrometer with an organic scintillator and the time-of-light separation of gamma radiation, (2) fast response Wilson cloud chamber valve, (3) a method of measuring inefficiency of grid shielding in a grid ionization chamber, (4) rectangular Wilson chamber, (5) fast burst reactor, (6) measuring spectra and the temperature of neutron gas in a graphite-water reactor, and (7) behavior of graphite in the construction of nuclear reactor moderators.

AD-263 725 Div. 20
(TIPSP/WH) OTS price $2.60

Electro-Optical Systems, Inc., Pasadena, Calif.
CESIUM ION-ATOM CHARGE EXCHANGE SCATTERING.
Final rept. 1 Sep 60-30 Sep 61,
by R. C. Speiser. 30 Sep 61, 24p. incl. illus.
(EOS rept. no. 1583-Final)
(Contract Nonr-330500, Proj. NR 012-112)
Unclassified report

DESCRIPTORS: (*Cesium, *Ions, *Atoms, Electrons.) (Ion beams, Attenuation, Kinetic theory, Measurement.) (*Ion rockets, Electrostatic accelerators, Ion sources.) (Statistical analysis, *Probability, Curve fitting.) Quantum mechanics, Scattering.

The charge transfer cross section for cesium ions and atoms was measured as a function of interaction velocity in the range 2 x 10 to the 6th power cm/sec to 1.2 x 10 to the 7th power cm/sec (300 ev to 10 kev). The measurements were made using crossed ion and atom beams with the atom beam chopped. The data fits a curve the square root of sigma equals A-B log (v/10 to the 6th power cm) with A equals 1.96 x 10 to the -7th power cm and B equals 0.85 x 10 to the -7th power cm. The general form of this curve is in agreement with theory although the constants do not agree closely with any theoretical calculation. In the Appendix, the data are applied to the calculation of a limit on ion motor operation lifetimes. (Author)

AD-263 844 Div. 20
(TIPSP/WH) OTS price $11.00

Illinois U., Urbana.
CORRELATED PROTON-PROTON PAIRS FROM THE HIGH ENERGY PHOTODISINTEGRATION OF LIGHT NUCLEI,
by Alan V. Larson and James H. Smith. Aug 61, 139p. incl. illus. tables, 65 refs. (Technical rept. no. 27)
(Contract Nonr-183405)
Unclassified report

DESCRIPTORS: (*Radioactivation analysis, *Targets, Helium, Lithium, Carbon, Bremsstrahlung.) (Photons, Protons, Neutrons.) (Proton reactions, *Photonuclear reactions, Nuclei, Scattering, Mesons.)

Targets of He, Li, C, and Al were irradiated by bremsstrahlung of 257 Mev maximum photon energy. Photodisintegrations which involve two fast protons were observed. Energy and angular distributions of the coincident protons, one of which was always observed at a laboratory angle corresponding roughly to 90 degrees in the center of mass of the two protons, were measured. The primary absorption of the photon occurs on neutron-proton pairs. The proton-proton pairs arise from subsequent internal scattering of the primary photoneutron from other protons in the nucleus. No evidence is seen that mesons are reabsorbed on nucleon pairs which do not include the parent nucleon. An upper limit is established for this process. This experiment supports the photomeson production models which do not depend upon the true absorption of mesons as they pass through nuclear matter. (Author)

21. NUCLEAR PROPULSION

AD-263 423 Div. 21, 30, 20
(TIPSP/WLH) OTS price $10.50

General Dynamics/Fort Worth, Tex.
NUCLEAR R & D.
1 July 61, 132p. incl. illus. (Document no. NARF-61-8T; FZK-9-164)
Unclassified report

DESCRIPTORS: (*Nuclear propulsion, Aircraft, *Research reactors, Light water reactors.) *Nuclear physics laboratories, Radiochemistry laboratories, Radioactivation analysis, *Aeronautical laboratories, Test facilities.

Contents:
Nuclear facilities
Reactor operations
Radiation shielding
Radiation effects
Space studies
Nuclear safety
Nuclear instrumentation
Nuclear design
Main-plant support
Staff

22. ORDNANCE

AD-263 204 Div. 22
(TIPSB/LH) OTS price $5.60

Professional Design Co., Agawam, Mass.
ENGINEERING, DESIGN AND DEVELOPMENT WORK ON RIFLES, MACHINE GUNS AND SPECIAL WEAPONS.
Final narrative summary, 2 June-31 July 61.
31 July 61, 1v. incl. tables.
(Contract DA 19-020-504-ORD-4947, Proj. TS2015)
Unclassified report

DESCRIPTORS: *Automatic weapons, *Small arms, Grenades, Recoilless rifles, Rifle grenade launchers, Design, Engineering, Calibration, Aircraft guns, Installation.

AD-263 344 Div. 22
(TIPSE/CDM) OTS price $1.60

Naval Weapons Lab., Dahlgren, Va.
EXTERIOR BALLISTIC TESTS OF THE 56-LB. PRACTICE BOMB MK 89 MOD 0 WITH LUG RELEASED FROM FJ-4B AIRCRAFT EQUIPPED WITH THE PRACTICE BOMB RACK ADAPTER AERO X4A,
by C. L. Keller. 25 Aug 61, 19p. incl. illus. tables. (NWL rept. no. 1769)
(In cooperation with Dayton U. Research Inst., Contract N 600(178)52680)
Unclassified report

DESCRIPTORS: (*Bombs, Training ammunition, *Exterior ballistics, Free fall missiles, Tests.) (*Bomb racks, Adapters, Release mechnisms, Naval aircraft.) (Jet fighters, Bombing, Fighter bombers, Dive bombing.)

Free flight tests of twenty 56-lb. Mk 89 Mod 0 practice bombs with one lug were conducted during 1958. The bombs of these tests were released from a practice bomb rack adapter Aero X4A mounted on an FJ-4B aircraft performing level, dive, and loft maneuvers. The purpose of these tests is to determine whether the Aero X4A rack adversely affects the ballistic characteristics of the Mk 89 Mod 0 practice bomb. On the basis of the results reported herein, it is concluded that: (a) the ballistic data used to compute OP 2787 are applicable to the Mk 89 Mod 0 practice bomb when dropped from the practice bomb rack adapter Aero X4A under the conditions of the tests; (b) the dispersion of the bombs tested is acceptable; and (c) the Mk 89 Mod 0 practice bomb with one lug has good flight characteristics, when dropped from the practice bomb rack adapter Aero X4A under the conditions of the tests. (Author)

AD-263 373 Div. 22, 30
(TIPSF/NTM) OTS price $2.60

Air Force Proving Ground Command, Eglin Air Force Base, Fla.
HYPERVELOCITY IMPACT FACILITY LIGHT-GAS PROJECTOR DEVELOPMENT,
by R. B. Fendick. June 61, 23p. incl. illus. tables (Rept. no. APGC TR-61-31)
(Proj. no. 8871V1)
Unclassified report

DESCRIPTORS: (*Hypervelocity projectiles, Launching, Hypervelocity guns, Projectiles, Tungsten compounds, Carbides, Aluminum.) (*Sabot projectiles, Targets, *Impact shock.) (Gases, Helium.) (Design, Test facilities.)

The major accomplishment during this reporting period was launching a 1/8-in. diameter aluminum projectile at a velocity of 22,030 fps. Refinements were made in saboting techniques that produced clean projectile impacts on the target. Launching 1/4-in. diameter tungsten carbide projectiles was successful up to 12,800 fps and 1/4-in. diameter aluminum projectiles to 16,000 fps. Modifications to the lightweight piston (4 oz) were responsible for achieving higher velocities. (Author)

AD-263 381 Div. 22
(TIPSE/VB) OTS price $3.00

Naval Ordnance Lab., White Oak, Md.
VARICOMP. A METHOD FOR DETERMINING DETONATION-TRANSFER PROBABILITIES,
by J. N. Ayres, L. D. Hampton and others.
July 61, 156p. incl. illus. tables, 42 refs.
(NAVWEPS rept. no. 7411)
Unclassified report

DESCRIPTORS: (Statistical analysis, Statistical functions, *Explosives, Sensitivity, Detonation.) (Reliability, Safety, Weapons.) (*Explosive trains, Probability, Detonation.)

Varicomp is a method for determining the detonation-transfer probabilities of an explosive train by substitution of explosive(s) of varied sensitivities or energies for the design explosive. These substituted--Varicomp--explosives (whose response or output probability distribution functions have been calibrated relative to the design explosive) are used to measure the explosive drive inherent in the design system. Methods of calibrating explosives and carrying out Varicomp performance tests are given along with statistical procedures for combining performance test and calibration data. These procedures are the basis for predictions, at high confidence levels, of very high reliability (or safety) of an explosive system based on a relatively small number of tests carried out on the explosive system. Computational aids and a number of illustrative examples are included. (Author)

AD-263 387 Div. 22
(TIPSB/CCH) OTS price $2.60

Rock Island Arsenal Lab., Ill.
155 MM HOWITZER CARRIAGE, M1A2E3 AND RECOIL MECHANISM, M6A2E2.
Notes on Development Type Materiel.
Nov 58, rev. Aug 61, 30p. incl. illus.
Unclassified report

DESCRIPTORS: Howitzers, *Self propelled guns, *Recoil mechanisms, Fire control systems, Design.

AD-263 437 Div. 22
(TIPSE/CDM) OTS $1.60

Naval Weapons Lab., Dahlgren, Va.
INVESTIGATION OF THE SUSCEPTIBILITY OF AN EXPERIMENTAL EXPLODING BRIDGE WIRE EXPLOSIVE INITIATOR TO ELECTROMAGNETIC ENERGY,
by W. L. Gilbertson. 31 Aug 61, 15p. incl. illus. tables (NWL Rept. no. 1772)
Unclassified report

DESCRIPTORS: (*Electric detonators, Detonators, Tests, Radiofrequency, Hazards, Electromagnetic waves, Wave transmission.) (*Explode mechanisms, Wire, Detonation, Tests.) (Nylon, Dielectric properties.) (Naval ordnance, Safety.)

An experimental exploding bridge wire initiator was developed as part of a continuing program to devise methods to protect modern ordnance systems from inadvertent actuation by electromagnetic radiation. Tests were conducted to determine the susceptibility of this item to initiation by electromagnetic energy. The tests demonstrated that while the initiators could not be fired in a normal fashion (by exploding the bridge wire) by radio frequency energy fields encountered in present service conditions, the units could be initiated by cook-off following burn out of the bridging wire. Actuation in this manner is due primarily to dielectric heating in the nylon dielectric material. It is recommened that the nylon be replaced with a more suitable material before any further electromagnetic energy susceptibility tests are conducted. (Author)

AD-263 451 Div. 22, 3
(TIPSM/EJH) OTS price $6.60

Edo Corp., College Point, N. Y.
EX-38 500 LB. CHEMICAL BOMB DEVELOPMENT.
Final rept.,
by F. F. Taranto. 31 Aug 61, 61p. incl. illus. tables (Rept. no. 5412)
(Contract DA 18-108-405-cml-438)
Unclassified report

DESCRIPTORS: (*Chemical bombs, Bombs, Fragmentation ammunition, Design, Configuration, Aerodynamics, Ballistics, Failure (Mechanics), Production, Manufacturing methods, Welding, Costs, Handling, Tests, Test methods.)

The purpose of this contract was to design, develop and fabricate twelve production prototypes of a highly efficient 500 lbs., massive chemical warfare, fragmentation bomb. Efficient payload and aerodynamic characteristics compatible with current Navy shipboard aircraft were the most important objectives. All work done under this contract, including the results of the CWL test evaluation of the first two prototype bombs delivered, and the experience gained during fabrication of the bombs is summarized. (Author)

AD-263 694 Div. 22, 12, 30, 8
(TIPSE/DLW) OTS price $5.60

Armour Research Foundation, Chicago, Ill.
ELECTROMAGNETIC PROJECTOR STUDY,
by J. L. Radnik and B. F. Lathan. July 61, 53p. incl. illus. tables, 24 refs.
(Contract AF 08(635)840, Proj. 3805)
(ASD TR 61-35) Unclassified report

DESCRIPTORS: (*Space weapons, *Hypervelocity guns, Electromagnetic fields, Magnetic fields, Hypervelocity projectiles, Electromagnetism, Electromagnetic effects, Electromagnetic drives, Thermal stresses, Effectiveness, Tests, Feasibility studies.) (Induction motors, Electromagnetic waves, Wave transmission.)

The performance characteristics of the parallel-rail, the repulsion coil, and the induction motor electromagnetic projectors were studied to determine the feasibility of the electromagnetic projector as an aerospace vehicle weapon and a hypervelocity laboratory instrument. The investigation consisted of a survey of previous investigations, a study of the basic electromechanical relationships, the determination of ultimate projector capabilities, and a brief study of supplemental applications. It was concluded that the only projector that has any promise for aerospace weapon application is the induction motor type. (Author)

AD-263 870 Div. 22
(TIPB/CW) OTS price $11.00

Armour Research Foundation, Chicago, Ill.
GROUND SHOCK ISOLATION OF BURIED STRUCTURES.
Final rept.,
by E. Sevin, S. Shenkman, and E. Welch. July 61, 141p. incl. illus. tables.
(Contract AF 29(601)2586)
(AFSWC TR 61-51) Unclassified report

DESCRIPTORS: (Soils, Pressure, Measurement, Instrumentation, Accelerometers, Explosives, Detonation, *Detonation waves, *Shock waves, *Vibration, Production, Propagation, Experimental data.)

Small aluminum cylinders (2 in. diam. x 8 in. long) were embedded in dry Ottawa sand and subjected primarily to the ground shock components of an HE charge. Accelerometers mounted on the models are used to measure the motions of the models. Various devices were then employed on or about the models to alleviate the induced motions as compared to the unisolated response. These isolation devices consisted of open and closed cell polyester urethane foams and loose and dense sand contained in a stovepipe. In addition, variations in model response with changes in over-all bed density were investigated. The study demonstrated that model accelerations generally increase with increasing bed density and that the effectiveness of isolation systems must be measured relative to the characteristics of the over-all bed. It is also shown that the high frequency components of model response are important for models placed close to the charge. The study reinforced previous conclusions regarding the validity of testing procedures and the effectiveness of soft foam isolation. (Author)

23. PERSONNEL AND TRAINING

AD-263 374 Div. 23, 28
(TIPSB/CCH) OTS price $1.60

Air Force Proving Ground Command, Eglin Air Force Base, Fla.
PERFORMANCE EVALUATION OF PERSONNEL SPECIALIST GRADUATES OF ATC COURSE ABR73230,
by Grey L. Adams. June 61, 17p. incl. illus. tables (Rept. no. APGC TR-61-34)
(Proj. no. 998HL46)
Unclassified report

DESCRIPTORS: *Aviation personnel, *Training, Selection, Group dynamics, Training devices, Test methods, *Job analysis, Effectiveness.

This evaluation was conducted to determine the ability of personnel specialist apprentices graduated from Air Training Command Course Nr ABR73230 to perform the duties of their specialty, and to further ascertain the effectiveness of directed duty assignees (DDA's). The performance of the two groups working in an operational environment was evaluated for a 90-day period, utilizing Eglin AFB, Florida, as the test site. Ten airmen were assigned, five were school graduated apprentices and five were directed duty assignees. The apprentices accomplished the majority of their assignments competently after they had been on the job for only one week. The instruction received by the apprentices was considered adequate to perform the majority of tasks; however, it is recommended that the present course be revised to include extensive use of personnel manuals in conjunction with practical workshop problems in the area of preparation and maintenance of personnel reports and forms. (Author)

AD-263 439 Div. 23
(TIPSB/LH) OTS price $33.60

Pittsburgh U., Pa.
TRAINING RESEARCH AND EDUCATION,

ed. by Robert Glaser. 1961, 676p. incl. illus. tables.
(Contract Nonr-62409)

Unclassified report

DESCRIPTORS: *Education, Instructors, *Research program administration, *Training, Training devices, Teaching machines, Theory, Reaction (Psychology).

AD-263 690 Div. 23, 8
(TIPSB/CDW) OTS price $2.60

Air Force Proving Ground Command, Eglin Air Force Base, Fla.
PERFORMANCE EVALUATION OF APPRENTICE AIRCRAFT AND MISSILE ELECTRICAL REPAIRMEN. GRADUATES OF ATC COURSE NR ABR42330,
by Donald I. McSheehy. June 61, 21p. (APGC TR 61-33)

Unclassified report

DESCRIPTORS: (*Aviation personnel, *Guided missile personnel, Maintenance personnel, *Training.) (Aircraft, Guided missiles, Electronic equipment, Maintenance, Effectiveness.)

This evaluation was conducted to determine the ability of apprentices graduated from Air Training Command Course Nr ABR42330, Aircraft and Missile Electrical Repairman, to perform the duties of their specialty. The performance of each apprentice was evaluated for a 12-week period during his first duty assignment. It was determined that 3 to 5 mo would be required for apprentices to develop job proficiency in their assignments. Intensive on-the-job training is necessary because of inadequate formal training in system trouble analysis. This deficiency was particularly evident in the areas of multiple alternator and generator power circuits. The present training gives greater emphasis to inspection procedures and to the internal construction and circuits of components than the job requires. The course should be revised to eliminate this training and place emphasis on system functioning and trouble analysis. It is desirable that apprentices acquire greater proficiency in the basic manual techniques, including terminal wire replacement, wire splicing and tying, soldering, and safteying. (Author)

AD-263 691 Div. 23, 12
(TIPSB/CDW) OTS price $3.60

Air Force Proving Ground Command, Eglin Air Force Base, Fla.
PERFORMANCE EVALUATION OF GUIDANCE AND CONTROL SYSTEMS MECHANICS (IM-99A). GRADUATES OF ATC COURSES ABR31130N-2 AND ABR31230N-2,
by Donald I. McSheehy. July 61, 29p. incl. tables (APGC TR 61-35)

Unclassified report

DESCRIPTORS: (Guided missiles, Test sets, Guidance, Control systems, Maintenance, Effectiveness.) (*Guided missile personnel, Maintenance personnel, *Training.)

Apprentices graduated from the guidance and control systems mechanics courses (IM-99A) require 2 to 3 mo of intensive training on the job before being capable of productive effort. This training inadequacy is due to insufficient time being allocated to certain instructional areas, inoperative equipment provided to conduct instruction, and the misalignment of subject materials offered in the courses to the job requirement. The effectiveness of the training is lost by emphasis on factual missile data rather than missile systems block diagram analysis. Recommendations are made that these courses be reoriented to provide a better knowledge of system layout and component identification, to eliminate unnecessary factual information, and to utilize the majority of the time available in block diagram analysis of the applicable systems, major assembly test sets, and the functional checkout set to the Job Training Standard proficiency levels indicated. The Job Training Standards for these specialties should be revised to require training to provide a working knowledge of the missile systems, the major assembly test sets, the functional checkout test set, and the service checkout equipment applicable to each Air Force specialty. (Author)

AD-263 692 Div. 23, 12
(TIPSB/CDW) OTS price $2.60

Air Force Proving Ground Command, Eglin Air Force Base, Fla.
PERFORMANCE EVALUATION OF APPRENTICE MISSILE EQUIPMENT SPECIALISTS (IM-99A). GNADUATES OF ATC COURSES ALR31530N-3 (GUIDANCE) AND ALR3153 0N-4 (CONTROL),
by Donald I. McSheehy. July 61, 20p. incl. tables (APGC TR 61-37)

Unclassified report

DESCRIPTORS: (*Guided missile personnel, Maintenance personnel, *Training.) (Guided missiles, Test sets, Operation, Maintenance, Effectiveness.)

Apprentices graduated from these courses receive sufficient training to enable them to perform technician (7-skill level) work on the equipment of the service checkout equipment bench. Because of their previous electronics experience, they are also capable of developing similar skill in the maintenance of functional checkout equipment and major assembly test sets. The present courses are not accurately oriented to the job in that the review of fundamentals is too basic for skilled personnel. The technical parts of the courses overemphasize service checkout equipment and provide insufficient familiarization with the systems of the missile, major assembly test sets, and functional checkout equipment. A revision of the courses to provide knowledge of the circuits of these systems is recommended. (Author)

AD-263 693 Div. 23, 12
(TIPSB/CDW) OTS price $2.60

Air Force Proving Ground Command, Eglin Air Force Base, Fla.
PERFORMANCE EVALUATION OF APPRENTICE MISSILE MECHANICS (IM-99A) GRADUATES OF ATC COURSE ABR43330-6,
by Donald I. McSheehy. July 61, 17p. (APGC TR 61-38)

Unclassified report

DESCRIPTORS: (*Guided missile personnel, Maintenance personnel, *Training.) (Guided missiles, Test sets, Missile launchers, Guidance, Control systems, Maintenance.)

Apprentices graduated from Air Training Command Course ABR 43330-6 receive generally adequate training. They learn their work in approximately one month, and develop to the 5-skill capability in 3 to 5 mo. Additional training is required in the use of pneumatic wrenches and the wing alignment tool, use of the ramjet test set, ammonia cabinet procedures, and the preservative

section of the hydraulic bench, and care in working in critical parts of the missile. The course is unnecessarily long because of the inclusion of lengthy explanations of procedures that can be learned more effectively on the job. A reduction in course length is recommended. The maintenance of the ramjet engine is within the capability of the missile mechanic. Inclusion of these duties in the job description and training of the missile mechanic is recommended. Inclusion of these duties in the missile mechanic AFSC will result in a reduction in IM-99A maintenance crew size. (Author)

AD-263 718 Div. 23
(TIPSB/CDW) OTS price $2.60

Air Force Proving Ground Command, Eglin Air Force Base, Fla.
EVALUATION OF APPRENTICE GRADUATES OF ATC COURSE NR. ABR70230 AND DIRECTED DUTY ASSIGNEES. ADMINISTRATIVE CLERK,
by Grey L. Adams. June 61, 22p. incl. illus. tables (APGC TR 61-32)
(Proj. 998HL45)
Unclassified report

DESCRIPTORS: *Aviation personnel, Training, Management engineering, Effectiveness.

This evaluation was conducted to determine the ability of administrative clerk apprentices graduated from Air Training Command Course Nr ABR 70230 to perform the duties of their specialty, and to further ascertain the effectiveness of directed duty assigness. The performance of the two groups working in an operational environment was evaluated for a 90-day period, utilizing Eglin AFB, Florida, as the test site. Sixteen airmen were assigned; eight were apprentice school graduates and eight were directed duty assignees. The apprentices accomplished the majority of their assignments competently after they had been on the job for only one week. The instruction received by the apprentices to perform the majority of tasks was considered adequate; however, it is recommended that the present course be revised to include extensive use of administrative series manuals in conjunction with practical projects and additional training on unit mail functions, particularly receiving, indorsing, and dispatching personal mail; and more time allotted to material edit. When directed duty assignees are properly screened, selected, motivated, and placed under competent supervision the DDA/OJT program is very successful. The average directed duty assignee utilized in this project was effective on the job at the 3-skill level approximately two months after initial field assignment. (Author)

AD-263 738 Div. 23, 28
(TIPSB/LH) OTS price $2.60

Adjutant General, Dept. of the Army, Washington, D. C.
VALIDATION OF ARMY FIXED-WING APTITUDE BATTERY AGAINST SUCCESS IN ROTC FLIGHT TRAINING,
by Nathan Rosenberg, Donald M. Skordahl, and Harry Kaplan. May 61, 15p. (HFRB Technical research note no. 111)
(Proj. 2L95-60-001)
Unclassified report

DESCRIPTORS: (Military training, *Army reserve, *Personnel, *Classification, Flight, Training, *Aptitude tests, Selection.) Tests, Analysis.

The Army Fixed-Wing Aptitude Battery (AFWAB), used operationally since 1956, is designed for use in identifying men who are likely to successfully complete a military flight training program and become useful Army pilots of fixed-wing aircraft. To evaluate the AFWAB for use in screening student applicants for Army ROTC-FTP, the battery was administered experimentally to 1245 FTP applicants, drawn from samples of academic years 1956-57, 1957-58, and 1958-59. Total AFWAB score and scores on component tests were analyzed in relation to successful completion of the ROTC Flight Training Program. Validity and intercorrelation coefficients obtained indicate that the AFWAB is an effective instrument for trainee selection. All component tests were found to contribute to the selective efficiency of the battery. Unit weighting of component scores was found to be as effective as the administratively more cumbersome optimally weighted score. In view of the findings, continued operational use of the complete battery is warranted. (Author)

AD-263 740 Div. 23, 28
(TIPSB/LH) OTS price $2.60

Harvard U. Medical School, Boston, Mass.
THE OPERANT CONDITIONING OF CONVERSATION,
by Gilbert Levin and David Shapiro. Aug 61, 26p. incl. illus. (Technical rept. no. 1)
(Contract Nonr-186643, Proj. NR 170-518)
Unclassified report

DESCRIPTORS: *Education, Training, *Verbal behavior, Group dynamics, Reaction (Psychology), Reasoning, *Social sciences, Theory, Tests, Test methods.

This paper shows how the operant conditioning of serial order of conversation may be carried out without subjects' awareness. In post-group interviews with subjects, not one noticed a connection between conversational sequence and getting the right answer, although several suspected that the guessing game was rigged in some way. During the experimental sessions themselves, subjects offered a great variety of complex and often inconsistent hypotheses to account for their increasing success in figuring out how the experimenter devised his list of colors. The results of the studies are all consistent with the hypothesis that the order of speakers in a conversation can be brought under experimental control by manipulating the variable of group reinforcement. In each group, a conversational sequence became established at a given level after about 50 to 100 trials, or within a half hour of conversation. (Author)

AD-263 741 Div. 23, 28
(TIPSB/LH) OTS price $1.60

Adjutant General Dept. of the Army, Washington, D. C.
VALIDATION OF THE ARMY FIXED-WING APTITUDE BATTERY AGAINST SUCCESS IN ARMY FLIGHT TRAINING,
by Nathan Rosenberg, Harry Kaplan, and Donald M. Skordahl. May 61, 14p. incl. illus. tables.
(HFRB Technical research note no. 112)
Unclassified report

DESCRIPTORS: (*Military training, *Army reserve, Flight, Training.) (*Aptitude tests, Analysis, Effectiveness.) (*Military personnel, *Pilots, Selection, Classification.)

To effect improvement in selection of trainees for the Army Aviation Fixed-Wing Training Program, a battery of HFRB tests, in operational use since 1956, was further validated against a criterion of success in the Primary Flight Training Course. The Army Fixed-Wing Aptitude Battery

(AFWAB), based on the Air Force Officer Qualification Test (AFOQT), was administered to 1109 men in classes entering the FTP at Camp Gary uring 1957. AFWAB scores were analyzed in relation both to failure to complete flight training and to failure by reason of flying deficiency. Results were examined to obtain information useful in establishing cutting scores appropriate to the Army's training requirements for a given year. The effect of weighting the tests by a multiple correlation procedure was also studied. The validity coefficient of .41 indicates that the AFWAB is a moderately effective instrument for selecting trainees for Army-Fixed-Wing flight training. Each of the five component tests also had significant correlation (a range from .15 to .34) with the pass-fail criterion. Battery scores based on unit-weighted subtests were as effective as those obtained by more complicated statistical weighting.

AD-263 742 Div. 23
(TIPSB/CDW) OTS price $1.60

Adjutant General, Dept. of the Army, Washington, D. C.
PREDICTION OF UNACCEPTABLE PERFORMANCE IN THE ARMY,
by Walter A. Klieger, Adrian U. Dubuisson, and John E. deJung. June 61, 8p. incl. tables (HFRB Technical research note no. 113)
(Proj. 2L95-60-001)
Unclassified report

DESCRIPTORS: (*Military personnel, *Attitudes, *Behavior, Acceptability, Identification, Determination.) (Achievement tests, Mathematical prediction, Psychometrics.)

The Retention Standards Task was established for the early identification of enlisted men who meet current induction or reenlistment standards but whose cumulative record of performance in the Army is likely to prove unacceptable. The purpose of the present study was to explore the potential usefulness of a variety of personnel measures in identifying those enlisted personnel likely to become disciplinary problems in the Army. Several personnel measures, obtained on a group of 1780 first-term enlisted men completing basic combat training at Fort Leonard Wood during 1953-54, were evaluated as possible predictors of military unacceptability. These measures included the men's AFQT scores, various indices based upon background information on the men, Average Basic Training Ratings, scores on a basic training written proficiency test, and scores on a basic training performance (stakes) test. Indices of unacceptability were based upon type of discharge and courts-martial record. The measures through which unacceptable men are most likely to be identified were found to be AFQT score and age at entry--measures available prior to a man's entry into the Army. The Ratings, the stakes test and the written proficiency test were found to be predictive of military delinquency, but only the stakes test and the Ratings could add to the predictiveness of the first two measures. (Author)

AD-263 743 Div. 23, 28
(TIPSB/CW) OTS price $4.60

Adjutant General, Dept. of the Army, Washington, D. C.
HUMAN FACTORS STUDIES IN IMAGE INTERPRETATION: THE VALUE OF STEREOSCOPIC VIEWING,
by J. Zeidner, R. Sadacca, and A. I. Schwartz. June 61, 37p. incl. illus. tables (HFRB Technical research note no. 114)
(Proj. 2L95-60-001)
Unclassified report

Portions of this paper were presented at the Sixth Annual Human Factors Engineering Conference, Fort Belvoir, Va., 6 Oct 60.

DESCRIPTORS: (*Photographic intelligence, *Military intelligence, Processing.) (*Targets, Detection, Identification, *Aerial photographs, *Photographic analysis, Stereoscopes, Human engineering, Psychology.) (*Military personnel, Selection.)

In the continuation of research concerned with development of techniques to improve performance of image interpreters, the usefulness of stereoscopic viewing was assessed in terms of quality of information obtained and the rate at which it is extracted. Tactical and strategic photographs were used in developing performance measures which were administered during July and August 1960 to two matched groups of image interpreters at the U. S. Army Intelligence Center. For each measure, stereo pairs were provided to one of the two groups and nonstereo photographs to the other. Analysis of the data obtained established an equivalence of stereo and nonstereo viewing in terms of quality of information provided and confidence assigned by interpreters to their responses. The number of objects reported tended to be higher, however, under the nonstereo viewing condition. Findings strongly suggest that (1) need for stereo capability should be demonstrated before new display equipment is developed for use of military image interpreters; and (2) future studies should examine additional interpreter functions.

AD-263 763 Div. 23, 1
(TIPSB/CW) OTS price $10.10

Armed Forces-NRC Committee on Bio-Astronautics, Washington, D. C.
THE TRAINING OF ASTRONAUTS. REPORT OF A WORKING GROUP CONFERENCE.
1961, 118p. incl. illus. table, 17 refs.
(Publication no. 873)
Unclassified report

DESCRIPTORS: (*Aviation personnel, *Training, *Space flight, Simulation, Training devices, Physical fitness, Stress (Physiology), Stress (Psychology), Conferences.)

24. PHOTOGRAPHY AND OTHER REPRODUCTION PROCESSES

AD-263 593 Div. 24
(TIPSB/LH) OTS price $5.60

Xerox Corp., Rochester, N. Y.
DEVELOPMENT TEST SUPPORT FOR MINICARD VIEWER PROCESSOR MX-1993(XW-1)G.
Final technical rept.
15 July 61, 51p. incl. illus.
(Contract AF 30(602)2343, Proj. 4591)
(RADC TR 61-197) Unclassified report

DESCRIPTORS: Data storage system, *Photographic recording system, *Microphotography, Procurement, Installation, Maintenance, Film readers.

Division 25-PHYSICS
25. PHYSICS

AD-263 102 Div. 25
(TIPSM-BRW) OTS price $2.60

Space Technology Labs., Inc., Los Angeles, Calif.
DISPLACEMENTS AND ROTATIONS IN SHORT, CIRCULAR CYLINDRICAL SHELLS,
by J. H. Baltrukonis. 5 Feb 58, 17p. incl. illus.
(Rept. no. GM-TN-0165-00115)
(Contract AF 04(647)165)
Unclassified report

DESCRIPTORS: (*Cylindrical bodies, Structural shells, Deflection, Deformation, Moments, Load distribution, Shear stresses, Stresses, Mathematical analysis, Theory.) Mechanics, Pressure tanks, Pressure vessels, Design.

The deflectional and rotational influence coefficients for an edgeloaded short circular cylindrical shell are introduced and their simplification is considered. It is shown that for a value of the shell parameter less than unity substantial simplification is possible. (Author)

AD-263 104 Div. 25
(TIPSE/NTM) OTS price $4.60

Thompson Ramo Wooldridge, Inc., Los Angeles, Calif.
THE SUPER-FAST LONGITUDINAL PINCH,
by Burton D. Fried. 12 Nov 57, 40p. incl. illus. tables (Rept. no. ARL-7-60)
(Contract AF 04(647)127)
Unclassified report

DESCRIPTORS: (*Magnetic pinch, *Plasma physics, Magnetohydrodynamics, Electrons, Acceleration, Heating, Gas ionization, Ions.) (Thermonuclear reactions, Thermonuclear experiments, Electromagnetic fields, Magnetic fields, Mathematical analysis.)

The superfast non adiabatic pinch is a promising method of heating a plasma without violating the conditions necessary for subsequent confinement with a stabilized pinch. An experimental test of the feasibility of a superfast longitudinal pinch at high density is currently in progress. The ideas underlying this concept are reviewed and a simple theoretical model is used for calculations of the results to be expected from these experiments. (Author)

AD-263 106 Div. 25, 8
(TIPSP/WH) OTS price $2.60

Thompson Ramo Wooldridge, Inc., Los Angeles, Calif.
VARIATIONAL PRINCIPLES FOR THE WAVE FUNCTION IN SCATTERING THEORY,
by Saul Altshuler. 14 Oct 57, 20p. (Rept. no. GM 42-386)
Unclassified report

DESCRIPTORS: (*Quantum mechanics, *Scattering, Absorption, *Electromagnetic waves, Propagation.) (Mathematical analysis, Integral equations, Green's function.)

Variational principles are designed for the solution of the Schroedinger equation when a point source is placed in the presence of an inhomogeneous, absorbing medium represented by an arbitrary complex potential function. When the point source is allowed to recede to infinity, these stationary structures reduce to variational principles for the wave function in the standard scatter problem, namely the outgoing solution to the Schroedinger equation for an incident plane wave. Finally in the asymptotic region, the well-known bi-functional variational principles for the transition amplitudes arise automatically from the stationary forms for the wave function describing the standard scatter problem. A few examples leading to variationally improved wave functions are discussed. (Author)

AD-263 108 Div. 25
(TIPSM/BRW) OTS price $2.60

Space Technology Labs., Inc., Los Angeles, Calif.
THE EFFECT OF SHEAR DEFORMATIONS ON THE BENDING OF THICK FLANGED CYLINDRICAL SHELLS UNDER INTERNAL PRESSURE,
by Paul Seide. 18 Nov 57, 18p. incl. illus.
(Rept. no. EM 7-16; Rept. no. GM-TR-283)
(Contract AF 18(600)1190)
Unclassified report

DESCRIPTORS: (*Cylindrical bodies, Structural shells, Pipes, Flanges, Hydrostatic pressure, Deflection, Deformation, Shear stresses, Stresses, Moments, Theory, Mathematical analysis.)

A recent problem for which a solution was requested was that of the bending stresses in a thick-walled tube under internal pressure, restrained by heavy integral flanges at its ends and closed by end plates. The arrangement of bolts and the end-plate configuration were such that the flanges could rotate without restraint from the end plates. Although the radius-thickness ratio of the tube was so small that shell theory was almost certainly invalid, it was felt that, in the absence of a more acceptable theory, the inclusion of shear deformation terms in the cylindrical shell and flange equations would yield some useful results. The derivation of the equations used in the investigation is reported as well as an illustrative example. It is interesting to note that (for this example) shear deformations were relatively unimportant; the calculated moment increased about 8% above that calculated from the equations neglecting shear deformations, due to weakening of the flange relative to the cylinder. (Author)

AD-263 124 Div. 25, 14
(TIPSE/NTM) OTS price $1.60

Watertown Arsenal Labs., Mass.
A REFLECTION METHOD FOR POLE FIGURE DETERMINATION.
Rept. on Research of Materials for Lightweight Construction,
by Stanley L. Lopata and Eric B. Kula. July 61, 13p. incl. illus. tables (Technical rept. no. WAL TR 826.52/1)
Unclassified report

DESCRIPTORS: (*X-ray diffraction analysis, Goniometers, *Crystals, Crystal structure, Test methods.) (Materials, Ferrites, Stainless steel.)

A modification is shown of the Schulz reflection method for determining pole figures which avoids the use of a separate transmission sample. A surface whose normal is equidistant 54 degrees 44 minutes from the rolling plane normal, rolling

direction, and transverse direction is cut on a composite sheet or solid sample. Complete information for one quadrant of the pole figure can be obtained by diffraction from this surface, with the geometry of the Schulz reflection method being maintained. A polar stereographic net has been constructed for use in plotting data from a sample surface cut at this angle. In addition, a randomizing net is shown which allows determination of the random intensity level of a pole figure, therby obviating the necessity of experimentally determining the random intensity on a separate random sample. (Author)

AD-263 148 Div. 25, 12
(TIPSM/BRW) OTS price $4.60

Aeronutronic, Glendale, Calif.
ELASTIC AND INELASTIC THERMAL STRESSES IN AN INFINITE FLAT PLATE,
by S. Scesa. 15 June 58, 34p. incl. illus. 11 refs. (Publication no. U-223)
(Contract AF 04(647)155)
Unclassified report

DESCRIPTORS: (*Sheets, *Graphite, Heat transfer, Thermal conductivity, Elasticity, Plasticity, Deformation, Thermal stresses, Stresses, Mathematical analysis, Theory.) (Re-entry vehicles, Design, Materials.)

An elastic and inelastic thermal stress analysis considering an infinite flat plate restrained in bending is investigated. Results of stress distributions and histories are presented for graphite using typical properties of this material and heat rates associated with re-entry body design. These results indicate that the elastic theory overestimates the magnitude of the maximum stresses due to the importance of stress relaxation which is considered in the inelastic stress analysis. Proper choice of graphite thickness and thermal conductivity for a given heat flux permits minimization of the maximum thermal stresses. (Author)

AD-263 155 Div. 25, 8
(TIPSM/BRW) OTS price $1.60

Barus Research Lab. of Physics, Brown U., Providence, R. I.
STUDY OF SURFACE PROPERTIES OF ATOMICALLY-CLEAN METALS AND SEMICONDUCTORS.
Quarterly progress rept. no. 10, 1 May-31 July 61,
by H. E. Farnsworth, D. Shooter, and J. Marsh. Aug 61, 9p. incl. tables.
(Contract DA 36-039-sc-78286, Proj. 3-99-15-110)
Unclassified report

DESCRIPTORS: (*Metals, *Semiconductors, Surfaces, Surface properties, Impurities, Cleaning, Heating, Ion bombardment, Heat treatment, Electron diffraction analysis.) (*Diamonds, Surfaces, Oxygen, Water vapor, Adsorption, Regeneration, Heat treatment, Ion bombardment, Hydrochloric acid, Nitric acid.) (*Germanium, Thin films, Catalysts, Hydrogen, Deuterium, Exchange reactions.)

Adsorption characteristics of O on the (111) diamond surface have been investigated. Cleaning the crystal face with aqua regia eliminated the problem of electrical charging of the crystal. Heating the crystal to temperatures up to 1100 C in a pressure of about 0.0001 mm Hg of H has resulted in observation of very intense integral order diffraction beams and very weak half-integral order beams. This indicates a qualitative similarity between the surface atomic arrangement of cleam diamond and those of Ge and Si. Since observations reported previously have shown no activity for the hydrogen-deuterium exchange reaction at the (100) surfaces of an atomically-clean Ge crystal, tests were made on a sputtered Ge film. The reaction chamber was altered to permit transport and isolation of the film in the ultra high vacuum and thus avoid spurious results from other surfaces. No activity was found for the sputtered film. The sensitivity of the method is evaluated and a comparison of this result with other published results is made. (Author)

AD-263 156 Div. 25
(TIPSE/RD) OTS price $5.60

Boeing Scientific Research Labs., Seattle, Wash.
LOSS MECHANISMS OF A LOW TEMPERATURE PLASMA ACCELERATOR,
by Gordon C. Oates, J. Kenneth Richmond and others. July 61, 55p. incl. illus. table, 10 refs. (Document no. D1-82-0124)
Unclassified report

Also available from the author.

DESCRIPTORS: (*Ion accelerators, *Electron accelerators, Plasma jets.) (Magnetohydrodynamics, Gas ionization, Plasma physics.) (Boundary layer, Electrodes, Hall effect.) (Argon, Potassium.)

Any comparison of the performance of various thrust devices must incorporate an analysis of loss mechanisms involved. The occurrence of large losses due to dissociation and ionization in high performance thermal thrust devices has led to considerable interest in low temperature plasma accelerators. The principle loss mechanisms in these accelerators are those due to the electrode boundary layer and to Hall current effects. An experimental and theoretical investigation has been carried out, using argon seeded with potassium, operating at a free stream temperature of 3000 K and at a pressure of about one atmosphere. (Author)

AD-263 171 Div. 25
(TIPSE/VB) OTS price $2.60

Illinois U., Urbana.
NON-LINEAR EQUATIONS FOR A SHALLOW UNSYMMETRICAL SANDWICH SHELL OF DOUBLE CURVATURE.
Technical rept.,
by Robert E. Fulton. Aug 61, 27p. incl. illus. 25 refs. (Structural research series no. 222)
(Contract Nonr-183403, Proj. NR 064-183)
Unclassified report

DESCRIPTORS: (*Sandwich construction, Structural shells, *Elastic shells, Deformation, Stresses.) (Deformation, Stresses, Determination, Partial differential equations, Non-linear differential equations.)

Equations are derived which governed the behavior of an elastic unsymmetrical doubly-curved sandwich shell. The face sheets may be of unequal thicknesses and of different materials. The equations include the non-linear effects; however, the restriction is made that the radii of curvature of the element are large when compared with the over-all thickness of the sandwich. The variational procedure is used to obtain three equations which govern the behavior of the shell and to determine the required boundary conditions. These resulting equations can be expressed in terms of a stress function, the radial deflection and a function which includes

the contribution of the core. For the symmetrical case where the face sheets are of equal thicknesses and the same materials these equations are shown to reduce to those given by Grigolyuk in 1957. For an example the equations are used to obtain the critical load and the snap-through load of a square cylindrical shell section loaded in the longitudinal direction. (Author)

AD-263 182 Div. 25
(TIPSP/GRW) OTS price $11.50

Lockheed Aircraft Corp., Sunnyvale, Calif.
EMISSIVITY: AN ANNOTATED BIBLIOGRAPHY,
comp. by A. A. Beltran. July 61, 151p. (Special bibliography no. SB-61-38; 3-77-61-6)
(Contract AF 04(647)787)
Unclassified report

DESCRIPTORS: (*Materials, *Optics, *Bibliography.) (Solids, Infrared radiation, Light, Ultraviolet radiation, Thermal radiation, Optical analysis, Temperature.)

The literature on the emissivity of materials in the infrared, visible and ultraviolet spectrum at temperatures to 3300 K is covered in this bibliography. Materials from 1905 through 1961 are included. (Author)

AD-263 190 Div. 25
(TIPSP/GRW) OTS price $4.60

Naval Ordnance Test Station, China Lake, Calif.
EQUATION OF STATE OF GASEOUS METALLIC PLASMAS,
by D. S. Villars. 3 Aug 61, 42p. incl. illus. tables (NOTS TP 2691)
(NAVWEPS rept. no. 7734) Unclassified report

DESCRIPTORS: (*Plasma physics, *Equations of state, Electron transitions, Quantum mechanics, Quantum statistics, Tables, Integration.) (Data processing systems, Programming, Digital computers.) Statistical functions, Metals.

Effort was made to implement a theory which applies modern statistical mechanics to the interactions prevailing between different types of charged particles in an ionized system to calculate the equation of state of gaseous metallic plasmas. Contributions to the pressure from these interactions are given by formulas in terms of correlation functions which relate the probability of finding a charged particle of type j in the immediate neighborhood of a point x sub j when a charged particle of type i is at the point x sub i. The latter are to be estimated by successive iteration of an exponential involving the product of the pair of charges and a double integral. The procedure was programmed on the IBM 709/7090 Electronic Data Processing System with the aid of FORTRAN language. Results are obtainable for temperatures of 10 to the 7th power and 10 to the 6th power K, but the computations diverge for temperature 100,000 K and charge density 0.001 atomic units, this despite the fact that the order of integration and summation in the formula was interchanged in the hope of getting cancellation of divergent factors. A mathematical study shows that the equation is essentially convergent. It is concluded that it may be possible to introduce adjustments into the program to obviate the practical difficulties. (Author)

AD-263 203 Div. 25
(TIPSP/JSM) OTS price $1.60

Plasmadyne Corp., Santa Ana, Calif.
BASIC STUDY OF ENERGY EXCHANGE PROCESS BETWEEN AN ELECTRIC ARC AND A GAS FLOW.
Final rept., 1 Mar 58-31 Jan 61,
by Paul G. Thiene. 23 Feb 61, 14p. incl. illus.
(Rept. no. 1FR021-334)
(Contract AF 49(638)334, Proj. 4750)
(AFOSR-1264) Unclassified report

DESCRIPTORS: *Gas flow, *Electric arcs, Energy.) (*Gas flow, *Vortices, *Sparks, Electric discharges, Stabilization, Photographic analysis.) (*High temperature research, *Gas flow, *Shock tubes, Magnetohydrodynamics, Plasma physics, Electric arcs, Argon.) Electric arcs, Plasma physics, Gas flow.

SPARK STABILIZATION BY A GAS VORTEX. (AD-228 775): Three experimental studies were conducted. The first demonstrated photographically the stabilization of a spark by a gas vortex during the initial phase of the electrical breakdown. A relatively thorough investigation of the radial pressure distribution in the vortex was conducted. A photographic study was carried out to give data on the expansion of the spark channel with time and to note if instabilities develop in the spark. CONTINUOUS HIGH-TEMPERATURE GAS FLOW FACILITY (AD-225 412): The plasma-flow facility has a flow of gas heated by a gas-stabilized arc capable of heating flow of argon to more than 10,000 K. An attempt was made to measure the average electrical conductivity of the plasma over the cross section of the tube. The conductivity was on the order of 1 mho/cm. Two simple experiments were performed which demonstrate the usefulness of the plasma-flow facility as a tool for studying magnetohydrodynamic interactions. THEORETICAL STUDY OF THE FLEXURE OF AN ARC POSITIVE COLUMN (AD-228 540): It was found that when a planar zone of ohmic heating is subjected to a uniform normal flow, an asymmetrical temperature distribution develops with a shift of the peak downstream. It appeared that the resulting curvature of the zone would give rise to two local reactions.

AD-263 209 Div. 25
(TIPSE/JSM) OTS price $4.60

Purdue Research Foundation, Lafayette, Ind.
SEMICONDUCTOR RESEARCH.
Quarterly rept. no. 3, 1 Apr-30 June 61.
30 June 61, 42p. incl. illus. tables.
(Contract DA 36-039-sc-87394)
Unclassified report

DESCRIPTORS: (*Semiconductors, *Electrical properties, *Optics.) (Magnetic properties, Infrared radiation, Gallium alloys, Antimony alloys, Intermetallic compounds, Absorption.) (Germanium, Infrared radiation.) (Paramagnetic resonance, Silicon.) (Germanium, Thermal conductivity, Magnetic susceptibility, Transport properties, Cryogenics.) *Radiation damage, *Low temperature research, Matrials.

AD-263 223 Div. 25
(TIPSM/BRW) OTS price $1.60

Space Technology Labs., Los Angeles, Calif.
FINITE BENDING OF PRESSURIZED CURVED TUBES WITH CIRCULAR CROSS SECTION,
by Eric Reissner. 22 Jan 58, 13p. (Rept. no. EM 8-1; GM-TR-0165-00308)
(Contract AF 04(647)165)
Unclassified report

DESCRIPTORS: (*Pipes, *Cylindrical bodies, Deflection, Deformation, Stresses, Pressure, Moments, Mathematical analysis, Differential equations, Series, Non-linear differential equations, Theory.)

A simple direct approach is described to the problem of determining stiffness and stresses for pure bending of curved tubes with circular cross section, with the effect of internal pressure included. The results include, as special cases, previously known results of the linear theory of bending of curved tubes, and also of the nonlinear theory of originally straight tubes. This analysis, which appears to be simpler than the previous work, is based on an appropriate use of results concerning the bending of pressurized circular rings. (Author)

AD-263 240 Div. 25, 30, 14
(TIPSM/BRW) OTS price $5.60

Armour Research Foundation, Chicago, Ill.
PHOTOELASTIC STRESS ANALYSIS OF A PRESSURE VESSEL.
Phase rept. no. 2, 15 Dec 60-15 Aug 61 on Stress Distributions in Two Redesigned Couplings, by W. F. Riley. 31 Aug 61, 50p. incl. illus.
(Rept. no. ARF 8204-15)
(Contract DA 11-022-503-ORD-3469)
Unclassified report

DESCRIPTORS: (*Pressure vessels, *Pipe fittings, Couplings, Screw threads, Design, Photoelasticity, Stresses, Analysis, Mathematical analysis, Load distribution, Pressure.) (*Photoelastic materials, Epoxy resins, Plastics, Model tests, Test equipment, Test methods, Polariscopes.)

A study was conducted to determine the stress distribution in 2 redesigned couplings being considered for use as part of the pressure vessel. The stress distributions were determined by using conventional 3-dimensional photoelasticity techniques on 0.533-scale models manufactured from an epoxy resin, Hysol 4290 (formerly known as Hysol 6000-OP). The loading applied to the model was internal pressure. The tensile stresses in the thread relief grooves were reduced to 4.3 and 4.7 times the internal pressure (in the opposed and staggered designs, respectively) by increasing the radius of the fillet. The highly localized stresses in the fillets at the roots of the sectored threads were not significantly reduced by incorporating 6 thread sectors in the tube end of the coupling in place of the 4 thread sectors. The stress distribution in the thread sectors was not appreciably influenced by the relative position of the thread sectors on the two ends of the coupling. (Author)

AD-263 247 Div. 25
(TIPSE/RD) OTS price $6.60

Institute for Fluid Dynamics and Applied Mathematics, U. of Maryland, College Park.
THE INTERACTION BETWEEN A MAGNETIC FIELD AND AN ELECTRICALLY PRODUCED SHOCK WAVE,
by John Paul Barach. July 61, 66p. incl. illus. tables (Technical note BN-255)
(Contract AF 49(638)401)
(AFOSR 1381) Unclassified report

DESCRIPTORS: (Krypton, Argon, Gas flow.) (*Shock waves, Shock tubes.) (*Magnetohydrodynamics, Plasma physics, Gas ionization, Electric discharges, *Magnetic fields, Electrodes.) (Magnetic fields.)

Shock wave flows of speeds up to 1 cm/usec have been observed to interact with a magnetic field of 5700 gauss. A reflected shock is observed and the deceleration of the flow is measured. Gas flows of up to Mach 63 in Krypton are produced by an annular electric shock tube powered by a discharge of long time constant. A radial magnetic field provides closed paths within the gas flow for the induced currents. The speed of the wave reflected off the magnetic field is found to increase with interaction strength. The flow momentum lost per particle as the flow traverses the field region, is calculated and compared to the impulse delivered each particle by the magnetic field. Agreement is found over a wide range of experimental conditions, validating the magnetohydrodynamic picture of the interaction and the use of the scalar gas conductivity. (Author)

AD-263 248 Div. 25
(TIPSM/BRW) OTS price $2.60

Johns Hopkins U., Baltimore, Md.
A NONLINEAR THERMOELASTICITY THEORY,
by Oscar W. Dillon, Jr. Aug 61, 22p. incl. illus. tables (Technical note no. 1)
(Contract AF 49(638)1031)
(AFOSR 1237) Unclassified report

DESCRIPTORS: (Solids, *Thermal stresses, *Elasticity, Deformation, Nonlinear systems, Theory, Mathematical analysis, Fourier analysis, Integral transforms, Rods, Torque, Torque couplings, Entropy, Thermal conductivity, Specific heat, Thermal expansion, Tests, Aluminum, Copper.)

The study is an analysis of the temperature generated by the deviatoric components of strain. After a general formulation of this effect, a specific case of the torsional oscillations of a round bar is considered. The solution of this problem indicates appreciable temperature can be generated at strains which would be considered small in the field of plasticity. (Author)

AD-263 269 Div. 25
(TIPSM/EJH) OTS price $1.60

Ordnance Materials Research Office, Watertown, Mass.
HARTREE-FOCK WAVE FUNCTIONS FOR THE 4p SHELL ATOMS,
by R. E. Watson and A. J. Freeman. June 61, 18p. incl. illus. tables (MRL rept. no. 103)
(Proj. no. TB 4-001) (In cooperation with AVCO, RAD, Wilmington, Massachusetts)
Unclassified report

DESCRIPTORS: *Atomic structure, *Electrons, *Atomic orbitals, Quantum mechanics, Functions, Gallium, Germanium, Bromine, Rubidium, Atoms, Ions, Zinc, Arsenic, Selenium, Krypton, Determination.

Conventional (or restricted) Hartree-Fock wave functions have been obtained for Ga(+), Ge(++), Br(-), Rb(+) and the neutral atoms Zn, Ga, Ge, As, Se, Br and Kr. Analytic Hartree-Fock methods utilizing a version of Nesbet's symmetry and equivalence restrictions, were used to obtain the solutions in analytic form (sums of powers of r times exponentials). Results are given in the form of wave functions, one-electron energies, and total energies. Comparison is made with the earlier results for Zn and Kr, the only atoms in this group for which H-F solutions exist. (Author)

AD-263 288 Div. 25, 20
(TIPSM/REB) OTS price $3.60

Tracerlab Inc., Waltham, Mass.
SOME EXPERIMENTAL RESULTS ON THE INTENSITY OF LOW ENERGY BREMSSTRAHLUNG FROM THIN AND THICK TARGETS,
by Paul Fredrickson. 9 June 61, 30p. incl. illus. tables (Rept. no. G-471)

(Contract AF 30(602)2189, Proj. 4519)
(RADC-TN-61-154) Unclassified report

DESCRIPTORS: (*Bremsstrahlung, Nuclear reactions, Electrons, X rays, Photons, Intensity, Analysis, Spectrographic analysis, Measurement, Theory.) (Targets, Gases, Nitrogen.) (Instrumentation, Radiation instruments, Electron guns, X-ray generators, Radiation counters, Vacuum apparatus.) Electron bombardment.

Two experiments are described which were performed to measure the Bremsstrahlung output from thin and thick targets. Each experiment was performed to compare the experimental and theoretical results concerning the generation intensity. No calculation or measurements have appeared in the literature dealing with the absolute intensity of emission from very thin targets. On the other hand, many experiments have been performed which verify Kramer's rule for thick targets except for very low bombarding energies (2-5 Kev.). One experiment, reported in the literature, indicated that the intensity was not described by Kramer's rule between 1 and 2 Kev. The thin target experiment verified the computational procedures used to determine the flux output. The thick target experiment revealed that no significant departure from Kramer's rule (greater than an order of magnitude) were apparent for electron bombarding energies between 2-5 Kev. (Author)

AD-263 310 Div. 25
(TIPSP/WLH) OTS price $1.10

Michigan State U., East Lansing.
NUCLEAR RESONANCE FLUORESCENCE MEASUREMENTS ON THE 845 KEV LEVEL IN Fe56,
by W. H. Kelly and G. B. Beard. 1961, 10p. incl. illus. tables.
(Contract AF 49(638)10; In cooperation with Wayne State U., Detroit, Mich.)
(AFOSR-868) Unclassified report

DESCRIPTORS: (*Iron, Manganese, Isotopes, *Fluorescence, *Nuclear resonance, Radioactive decay, Spectrographic analysis, Resonance absorption.)

Nuclear resonance fluorescence has been observed for the 845 kev level of Fe-56. A gaseous source of Mn-56 as MnC12 was used in order to utilize the recoil due to previous radiations to compensate for the recoil Doppler broadening of the emission and absorption lines. Resonant self-absorption measurements gave a half-life of (6 + or -2) x 10 to the -12th power sec for the state. (Author)

AD-263 324 Div. 25
(TIPSP/TL) OTS price $2.60

Columbia U., New York.
EXTENSIONAL WAVES ALONG THE EDGE OF AN ELASTIC PLATE,
by J. J. McCoy and R. D. Mindlin. July 61, 22p. incl. illus. (Technical rept. no. 46; CU-59-61-ONR-266(09)-CE)
(Contract Nonr-26609, Proj. NR 064-388)
Unclassified report

DESCRIPTORS: (*Sheets, Vibration, Motion.) (Velocity, Frequency, Differential equations, Algebra, Stresses, Functions.) (*Elasticity, Plasticity, Stresses, Wave transmission.)

A solution of second order equations of extensional motion of plates is obtained for waves travelling along a free edge. The usual Rayleigh-type wave is found to become more and more confined to the edge of the plate as the frequency increases. Above a certain frequency another edge wave is found. (Author)

AD-263 333 Div. 25, 4
(TIPSM/SEB) OTS price $1.10

Gates and Crellin Labs. of Chemistry, Calif. Inst. of Tech., Pasadena.
NUCLEAR MAGNETIC RESONANCE SPECTROSCOPY. ABNORMAL SPLITTING OF ETHYL GROUPS DUE TO MOLECULAR ASYMMETRY. II,
by Fred Kaplan and John D. Roberts. July 61, 5p. illus. (Technical rept. no. 13; Contribution no. 2738)
(Contract Nonr-22026, Proj. NR 055-388)
Unclassified report

DESCRIPTORS: (Organic compounds, *Ethyl radicals, *Nuclear magnetic resonance, Spectrographic analysis, Molecular spectroscopy.) (Ethyl radicals, Configuration, Molecular rotation, *Nuclear spins.) (Hydrogen, Chemical bonds, Resonance absorption.)

Studies of the nuclear magnetic resonance of ethyl groups are being conducted. The spectra of acetaldehyde diethyl acetal (I) and diethyl sulfite (II) are discussed as examples of magnetic nonequivalence of the methylene hydrogens in R-CH2-O-XR1R2R3, where R is equal to CH3 and X is equal to S, C, P, etc. Complete agreement between the computed 40 mc and observed 40 mc spectra of II in benzene was achieved only with the coupling of constants of opposite signs. This difference in sign between the geminal and vicinal H-H couplings runs directly counter to the theoretical predictions of Karplus and Gutowsky (J. Chem. Phys. 31:1278, 1959) and Karplus (J. Chem. Phys., 30:11, 1959). Different sets of spin-coupling and chemical-shift parameters were found to give nearly identical theoretical spectra for II in benzene and each of these corresponds well to the experimental spectrum at 60 mc.

AD-263 336 Div. 25
(TIPSP/WLH) OTS price $4.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
THE MEASUREMENT OF THE VAPOR PRESSURE OF ATOMIC SPECIES FROM SPECTROPHOTOMETRIC MEASUREMENTS OF THE ABSORPTION OF RESONANCE LINES. V. THE FREE ENERGY OF FORMATION OF TiC AND ZrC,
by G. L. Vidale. Aug 61, 42p. incl. illus. tables (TIS Rept. no. R61SD147)
(Contract AF 33(616)6841)
(ARPA Order no. 24-59, Task 6)
Unclassified report

DESCRIPTORS: (*Heat of formation, *Titanium compounds, *Zirconium compounds, Carbides, Entropy.) (Vapors, Vapor pressure, Absorption, *Spectrographic analysis, *Spectrophotometers.)

Spectrophotometric measurements of the absorption of the Ti3371 and the Zr3601 resonance lines were made of the equilibrium vapor over the pure metals and over the corresponding carbides, utilizing a hollow cathode discharge tube source previously described to generate the thin resonance lines. From the ratio of the pressure of the metal atoms over the pure metal, and over TiC and ZrC, the standard free energy of formation of each carbide has been computed. The corresponding values of the standard heat of formation were then obtained with the aid of the known entropies and heats of warming of the various compounds. (Author)

AD-263 341 Div. 25
(TIPSP/GRW) OTS price $3.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
SYMMETRY OF CONFIGURATIONAL ENTROPY IN LATTICE STATISTICS,
by W. H. Kleiner. 22 Mar 61, 31p. incl. illus. tables (Rept. no. 81G-0030)
(Contract AF 19(604)7400)
Unclassified report

DESCRIPTORS: (*Entropy, *Solutions, Solids, *Lattices, *Molecules.) Solid state physics, Statistical analysis.

An investigation is made of the general conditions under which the configurational entropy of a binary solid solution is symmetrical with respect to composition about the 50-50 composition point. Spin coordinate and occupancy number representations of the configurational energy are discussed. When the sites of the site array are equivalent due to spatial symmetry, the configurational entropy is symmetrical for any pair interaction model. Asymmetry of the configurational entropy implies the presence of some n-site interactions, n equals 3, 5, 7,... Application of these results to order-disorder alloy and physical adsorption systems is considered. (Author)

AD-263 365 Div. 25
(TIPSM/JSM) OTS price $7.60

Washington U., Seattle.
THE INFRARED SPECTRUM OF CH3SiH3 AND CH3SiD3,
by R. E. Wilde. 31 Aug 61, 75p. incl. illus. tables, 17 refs. (Technical rept. no. 3)
(Contract N8onr-47719, Proj. NR014-402)
Unclassified report

DESCRIPTORS: (*Infrared spectroscopy, *Silanes, *Deuterated compounds, *Methyl radicals, Molecular spectroscopy.) (*Silanes, *Infrared spectroscopy.)

Because a search of the current literature failed to yield complete vibrational IR data for CH3SiH3 and CH3SiD3, the IR spectra of these molecules are reported for the region between 450 and 10,000 lines/cm. The fundamental frequencies are assigned to normal modes of action, and assignments are given to many of the overtone and combination bands. The high-resolution IR spectra of 6 bands of CH3SiH3 and of 2 bands of CH3SiD3 in the 2000 to 5000-lines/cm region are reported. A HIGH RESOLUTION INFRARED STUDY OF DISILANE IN THE REGION 2000-5000 cm(-1), by R. E. Wilde. 31 Aug 61, 18p. incl. illus. tables. 11 refs. The present work reports the analysis of an IR band at 2169.42 cm(-1) which corresponds to the fundamental Si-H stretching motion, and the analysis of a combination band at 4256.36 cm(-1). Both bands are perpendicular type bands.

AD-263 389 Div. 25
(TIPSP/GRW) OTS price $5.60

Research Technology Associates, Inc., Avon, Mass.
STUDY OF ELECTRON AND ION BEAMS UNDER OUTER SPACE CONDITIONS.
Final rept.,
by J. Babakian. 12 May 61, 53p. incl. illus. 25 refs.
(Contract AF 19(604)5864)
(AFCRL-539) Unclassified report

DESCRIPTORS: (*Ion beams, *Electron beams, *Space environmental conditions.) (Electrons, Density, Pressure, Water vapor, Measurement.) (Vacuum systems, Simulation, Ionization, Exosphere, Controlled atmospheres.)

As a result of equipment modification a unique, flexible, experimental high vacuum system is available for simulating a wide variety of environments as to pressure, gas and water vapor content. A number of means of producing variable ionization levels within the system were studied and applied. Electron density measurements and their applications were considered. Possible means of communicating through ionized media were evaluated. (Author)

AD-263 390 Div. 25, 8
(TIPSP/WLH) OTS price $2.60

Microwave Lab., Stanford U., Calif.
BEAM PLASMA AMPLIFIERS,
by M. A. Allen and G. S. Kino. July 61, 19p. incl. illus. (ML rept. no. 833)
(Contract Nonr-22548, Proj. NR 373-361)
Unclassified report

Presented at Wescon, August 22-25, 1961, at San Francisco, Calif.

DESCRIPTORS: (*Plasma physics, Electron beams, *Electron guns, Cesium, *Microwave amplifiers.) (Microwaves, Propagation, Electromagnetic waves, *Plasma oscillations.)

Recent experiments on electron beam-plasma interaction have been performed using a thermally generated cesium plasma. The experimental results obtained are in excellent agreement with the theoretical predictions. These experiments show that the possibilities of using this interaction for the amplification of microwaves may, in the future, provide significant advantages over the existing devices now available. There is a possibility of obtaining high efficiencies at high-power levels. Because no circuit is used, and because it may be possible to couple to the beam in radically new ways, millimeter wavelength amplifiers and oscillators based on beam-plasma interaction look extremely promising. The problems involved in the design of such devices are discussed. (Author)

AD-263 406 Div. 25
(TIPSP/WH) OTS price $3.60

Pennsylvania State U., University Park.
AN INVESTIGATION OF THE MACROSCOPIC EQUATIONS FOR A PLASMA,
by H. Li and R. D. Mathieu. May 60, 36p. (Technical rept. no. 13)
(Contract AF 49(638)647, Proj. 9751)
(AFOSR TN 60-1070) Unclassified report

DESCRIPTORS: (*Plasma physics, *Magnetohydrodynamics, Particles, Electrons.) (*Diffusion, Kinetic theory, *Electrons, Plasma physics.) (Electrons, Motion, Equations.) (Mathematical analysis, Integrals, Differential equations.) (Plasma physics, Dielectric properties.) Magnetic susceptibility.

The macroscopic equations for the conservation of mass, momentum, and energy, which are deduced from the particle viewpoint by using the classical Boltzman equation, are investigated for both a non-reacting plasma and a reacting plasma. The most general form of these equations is presented for variable material constants (dielectric constant and magnetic permeability). The resulting equations are compared with equations which were obtained from the continuum viewpoint of a control volume and a control surface for the plasma.

Division 25-PHYSICS

AD-263 441 Div. 25, 2
(TIPSP/GRW) OTS price $1.60

Naval Research Lab., Washington, D. C.
ATMOSPHERIC ATTENUATION COEFFICIENTS IN THE VISIBLE AND INFRARED REGIONS,
by G. L. Knestrick, T. H. Cosden, and J. A. Curcio. 8 Aug 61, 15p. incl. illus. tables.
(NRL rept. no. 5648)
Unclassified report

DESCRIPTORS: (*Light, *Infrared radiation, Attenuation, *Wave transmission, Measurement, Recording devices.) (Atmosphere, Absorption, Scattering, Aerosols, Particles, Climatic factors, Humidity.)

Atmospheric spectral attenuation coefficients were measured in ten narrow wavelength bands between 0.4 and 2.3 microns for a variety of weather conditions using two overwater, sea-level paths of 5.5 and 16.3 km. The wavelengths bands were chosen so as to avoid molecular absorption and were isolated by interference filters. A 60-in. diam, high-intensity source and a 24-in. diam, narrow-field receiver were combined to yield relative scattering attenuation coefficients (Greek sigma) as a function of wavelength (Greek lambda). These were then scaled using values obtained at one wavelength with a visual telephotometer. Log Greek sigma vs log Greek lambda curves show a wide range of slopes and shapes, with a tendency toward less slope in the infrared (indicating that Greek sigma is becoming independent of Greek lambda in the infrared). Some correlation with relative humidity was found for relative humidities greater than 70%. The anomalous slope reversal between 1.68 and 2.27 microns is discussed, and a possible explanation for the reversal is given as selective scattering by the aerosol at these wavelengths. (Author)

AD-263 444 Div. 25, 9
(TIPSP/JSM) OTS price $8.60

Thompson Ramo Wooldridge, Inc., Cleveland, Ohio.
INVESTIGATION OF A MAXIMUM MACH NUMBER PLASMA ACCELERATION CHANNEL.
Rept. for Feb 60-Mar 61,
by A. C. Eckert and R. G. Weirick. 26 May 61, 95p. incl. illus. 11 refs.
(Contract AF 33(616)7151, Proj. 3141)
(ASD TR 61-224) Unclassified report

DESCRIPTORS: (*Plasma physics, *Acceleration, *Magnetohydrodynamics, *Mach number, Plasma jets, Linear systems, *Ducts.) (*Plasma physics, Production, Electric fields, Magnetic fields, Glow discharges, Electric discharges, Electric arcs, Direct current.)

An experimental and theoretical investigation of a magnetohydrodynamic plasma acceleration device has been performed. The specific device of interest utilized the field configuration resulting from the theoretical analysis of the Maximum Mach Number concept as applied to a linear acceleration channel having a constant cross-sectional area. Methods of producing a plasma suitable for acceleration have been investigated and a theoretical and experimental analysis of plasma conductivity in the presence of a magnetic field has been performed. The MHD acceleration of a low-temperature, low-pressure plasma has been observed and a limited correlation with theory has been obtained. (Author)

AD-263 449 Div. 25, 8
(TIPSP/WLH) OTS price $4.60

Boeing Scientific Research Labs., Seattle, Wash.
TRANSVERSE DIFFUSION IN A QUASI-STATIC POSITIVE COLUMN,
by Roy R. Johnson and David A. Jerde. Sep 61, 40p. incl. illus. (Document no. D1-82-0118)
Unclassified report

Also available from the author.

DESCRIPTORS: (*Particles, *Magnetic fields, Helium, Discharge tubes, *Diffusion, Electric discharge, Plasma physics, Kinetic theory.) (Mathematical analysis, Integral equations.)

The transverse diffusion of a diverging positive column in a slowly varying magnetic field is measured experimentally, and compared with the corresponding steady-state theory. The theory is developed from the macroscopic equations for momentum and particle conservation, taking into account only charged particle-neutral atom collisions. Reasonable agreement is found between theory and experiment for discharge currents in Helium of the order of 50 - 500 ma, pressures of 0.6 to 1.0 mm Hg, and peak magnetic fields of up to 15 kilogauss. Rise times of the magnetic field are between 1 and 8 kilogauss/m sec. Unstable behavior of the current is observed only after the peak magnetic field is reached, even though the peak values are greater than the critical values observed by Lehnert (Phys. of fluids 3:600, 1960) and Allen et al (Phys. Rev. Hr. 5:409, 1960) for the onset of enhanced diffusion. (Author)

AD-263 458 Div. 25, 27
(TIPSE/JSM) OTS price $12.50

Aerojet-General Corp., Azusa, Calif.
TRANSPIRATION COOLING AND FLOW-SEPARATION CONTNOL BY GASEOUS INJECTION IN A POROUS NOZZLE.
Suppl. 2 to Final rept.,
by A. W. Magnusson, B. Misra, and W. R. Thompson. June 61, 173p. incl. illus. tables, 63 refs.
(Aerojet rept. no. 2024)
(Contract AF 33(616)5552, Proj. 3151)
(AFFTC TR 61-53) Unclassified report

DESCRIPTORS: (*Sweat cooling, *Rocket motor nozzles, *Porous materials, Exhaust gas ejectors, Thrust augmentor nozzles, Erosion.) (*Rocket motor nozzles, Computers, Mathematical analysis, Heat transfer, Fluid flow, Coolants, Porous materials.)

Transpiration cooling and flow-separation control by gaseous injection in a porous-wall rocket nozzle were evaluated in a pilot-scale study. Gaseous oxygen and hydrogen were used as propellants in a nominal 1000-lb-thrust system. Gaseous hydrogen was injected through a 1/4-in.-thick, porous, nozzle liner fabricated from 5-micron-particle-size sintered stainless steel, and with an expansion ratio of 25. The convergent and throat sections of this nozzle were severely eroded in the first test due to cracking of the liner. Eight subsequent tests were conducted on a modified nozzle which utilized the porous liner in the divergent section only. Transpiration cooling was 100% effective at an injectant/total propellant ratio of 0.028. A significant exhaust jet deflection was achieved by asymmetric mass addition in one test before a control malfunction caused nozzle burnout. A mathematical analysis of heat transfer and fluid flow in porous media is derived and the computer solution of the resulting equations is presented in terms of parameters of interest to nozzle designers. (Author)

AD-263 461 Div. 25
(TIPSE/RD) OTS price $1.10

Science and Tech. Section, Air Information Div., Washington, D. C.
INTERACTION OF A HIGH-FREQUENCY ELECTRIC FIELD

WITH PLASMA.
29 Aug 61, 2p. (AID rept. no. 61-123; Trans. from On the Pressure Exerted by a Nonuniform High-Frequency Electric Field on Positive-column Gas-discharge Plasma. Zhurnal tekhnicheskoy fiziki 31:343-347, Mar 61)
Unclassified report

DESCRIPTORS: (*Technological intelligence, USSR, Translations.) (*Electric fields, High frequency, *Gas ionization, *Gas discharges.) Plasma physics.

An experimental investigation is presented of the constant pressure exerted by a nonuniform hf electric field on plasma of a low-pressure positive-column discharge, this effect is significant in the problem of isolating plasma from container walls. The effect was studied in constant-current (5 ma) glow-discharge plasma contained in a cylindrical tube 50 cm long and 6 cm in diameter with air and with argon individually, both at a pressure of 3.7 x .1 mm Hg. The discharge tube contained a movable probe to measure plasma parameters at varying distances from the axis of the tube and a fixed probe as a control. (Author)

AD-263 465 Div. 25, 27, 10
(TIPSP/JSM) OTS price $10.10

Aerojet-General Corp., Azusa, Calif.
HEAT TRANSFER TO CRYOGENIC HYDROGEN AT SUPERCRITICAL PRESSURES.
Suppl. 1 to Final rept.,
by W. R. Thompson and E. L. Geery. July 60, 127p. incl. illus. tables, 37 refs. (Aerojet rept. no. 1842)
(Contract AF 33(616)5552, Proj. 3151)
(AFFTC TR 61-52) Unclassified report

DESCRIPTORS: (*Heat transfer, *Hydrogen, *Cryogenics, Liquefied gases, Heat exchangers, Rocket motors, Coolants.) Reynolds number, Temperature, High pressure research.

Heat transfer by forced convection to cryogenic hydrogen at supercritical pressures has been studied experimentally, using a resistance-heated tubular test element. Test pressures were varied from 680 to 1344 psia with fluid bulk temperatures at the test-section inlet ranging from 55 to 102 R. The maximum heat flux obtained was 8.0 Btu/sq. in.-sec, while the maximum wall-to-bulk temperature ratio was 16.5. Heat transfer to hydrogen was found to be characterized by two mechanisms, each differing in its dependence on Reynolds number and the wall-to-bulk temperature ratio. Although mean residence times were of the order of milliseconds, the data indicate that an appreciable fraction of the parahydrogen was converted to the ortho form, the degree of conversion increasing with wall temperature. Support is presented for the Powell hypothesis that a minimum exists in the heat-transfer coefficient near the critical temperature. Further, a second distinct but lesser minimum in the coefficient was found to exist about 50 to 75 R above the critical temperature. The Nikuradse equation was found to satisfactorily relate the friction factor and the bulk Reynolds modulus for supercritical hydrogen. (Author)

AD-263 470 Div. 25, 17, 30
(TIPSP/WH) OTS price $6.60

Army Rocket and Guided Missile Agency, Huntsville, Ala.
THE ARGMA PLASMA-JET FACILITY. A RESUME - 1958 TO 1960,
by C. M. Cason, T. A. Barr, and others.
1 July 61, 73p. incl. illus. tables, 22 refs. (ARGMA rept. no. TN 2H2N)
Unclassified report

DESCRIPTORS: (*Plasma jets, Gases, Argon, *Electric arcs.) (*High temperature research, Laboratories, Spectrographic analysis, Plasma physics.) (Materials, Re-entry vehicles, Tests.)

As part of the research program on phenomena in gases at temperatures above 5000 degrees K, a plasma-jet facility was constructed and put into operation in January 1958. The operation and application of this facility from January 1958 to December 1960 is described. The facility features an arc heater system controlled and stabilized by hot graphite electrodes and by a flow of gas parallel to the arc column. It has been used to provide information on gas heater designs for operation at gas temperatures up to 30,000 degrees K, to develop analytic spectroscopic techniques and probe techniques for plasma diagnostics, and to screen materials for high-temperature systems in rockets and reentry vehicles. (Author)

AD-263 524 Div. 25, 2
(TIPSP/WH) OTS price $5.60

Air Force Cambridge Research Labs., Bedford, Mass.
THE DETERMINATION OF PLASMA PROPERTIES BY RADIATION TECHNIQUES: A SURVEY,
by M. S. Longmire, S. H. Sternick, and S. B. Herskovitz. May 61, 51p. 42 refs. (AFCRL-348)
Unclassified report

DESCRIPTORS: (*Plasma physics, High temperature research, *Blackbody radiation, *Spectrographic analysis, Thermal radiation, Doppler systems.) (Temperature, *Stars, Measurement.)

A two-part survey is presented of radiation techniques currently employed in the diagnosis of higher temperature plasmas. The techniques treated are (1) the thermal or black-body radiation measurements; and (2) the line broadening of certain spectral lines. Historical, as well as theoretical backgrounds are included. Definitions, typical applications, and limits of reliability are discussed. An extensive bibliography, part of which is annotated, is included. (Author)

AD-263 532 Div. 25, 30
(TIPSM/BRW) OTS price $4.60

Little, Arthur D., Inc., Cambridge, Mass.
DEVELOPMENT OF AN EXPLOSIVE SYSTEM FOR ACCELERATING A METAL PELLET.
Final rept.,
by Wendell G. Sykes. 1 Oct 60, 37p. incl. illus.
(Contract AF 19(604)5740)
(AFCRL-633) Unclassified report

DESCRIPTORS: (Hypervelocity projectiles, Pellets, Nickel alloys, Iron alloys, Acceleration, Re-entry aerodynamics, *Propelling charges, Explosives, RDX, Plastic explosives, Processing, Hydraulic presses, Vacuum systems, Dies, Design.) (*Hypervelocity projectiles, Ballistics, Terminal ballistics, Velocity, Measurement, Test facilities.) (Particles, Pellets, Density, Velocity, Acceleration, Space flight.)

An explosive system was produced capable of accelerating a metal pellet to hypervelocities,

with a known in-flight pellet mass and velocity. The development of this system was part of a program to produce an accurate means for measuring the mass, density, and velocity distribution of particulate matter in space. A facility was designed and constructed for the vacuum pressing of an RDX-based, plastic-bonded explosive of a high and uniform density. The pellets were fired from a barricade, through Mylar screens electrically connected to a counter chronograph to measure their velocity, decelerated in foam, and recovered from Celotex boards. (Author)

AD-263 620 Div. 25, 12
(TIPSE/DLW) OTS price $11.50

RCA Defense Electronic Products, Moorestown, N. J.
MICROWAVE EMISSION FROM PLASMA. ELECTROMAGNETIC RADIATION: A PHENOMENOLOGICAL APPROACH.
Rept. on Down-Range Anti-Missile Measurement Program (DAMP).
Sep 61, 149p. 13 refs.
(Contract DA 36-034-ORD-3144)
(ARPA Order no. 51) Unclassified report

DESCRIPTORS: (*Plasma physics, Thermal radiation, *Thermodynamics, Electromagnetic fields, Partial differential equations, Groups (Mathematics), Statistical functions, *Electromagnetic theory, Statistical analysis, Mathematical analysis.) (*Re-entry vehicles, Re-entry aerodynamics, Gas ionization, *Plasma oscillations, Aerodynamic heating, Microwaves, Microwave spectroscopy, Spectrographic analysis, Measurement, Theory.) *Antiaircraft defense systems.

The macroscopic approach to the problem of equilibrium radiation from plasmas is treated based on the theory of electrical fluctuations and thermal radiation proposed by Rytov. The basic ideas underlying this general theory as well as the connection with other known theories of equilibrium radiation are discussed. The electromagnetic formulation of this theory is then presented. In particular the transition between the microscopic and the macroscopic electromagnetic equations is demonstrated and the connection with Rytov's equations is made. The statistical aspect of the problem is formulated and the general expressions for the time and space averages of the intensity of radiation is presented. A general method for solving problems of equilibrium radiation is outlined. A detailed derivation of this solution as well as an alternate solution in terms of the power absorptivity of the cylinder is given. (Author)

AD-263 638 Div. 25, 26
(TIPSM/BRW) OTS price $1.60

Texas Instruments, Inc., Dallas.
RESEARCH AND DEVELOPMENT OF YTTRIUM IRON GARNET SINGLE CRYSTALS.
Interim engineering rept. no. 9, 1 Apr-30 June 61,
by L. L. Abernethy, E. L. Johnson and others.
13 Sep 61, 15p. incl. illus.
(Contract NObsr-77571)
Unclassified report

DESCRIPTORS: (*Ferromagnetic materials, Single crystals, *Garnet, Yttrium compounds, Iron compounds, Oxides, Production, Growth, Zone melting, Dielectric properties, Magnetic properties.) (*Garnet, Production, Zone melting, Growth, Rare earth elements, Gadolinium compounds, Gallium compounds, Iron compounds, Oxides, Samarium.)

Yttrium iron garnet (YIG) single crystals 1/4 to 3/8 in. diameter with about 10 dielectric constant and 0.002 dissipation have been produced by the floating zone technique. Ferrimagnetic resonance line widths of 1 to 2 oersteds were obtained from polished test spheres. Successful experiments with Ga, Gd, and Sm-substituted YIG demonstrated the feasibility of the same technique for growing Ga or rare earth-substituted garnets. Experiments with YIG indicate that the floating zone technique can be modified to use oxygen pressure to 25 atmospheres, automatic control of temperature and zoning rate, and an effective growth rate of at least 0.20 in./hr. Thermal cracking is still a major problem, but YIG crystals 1/2-in. diam by 1-in. long can be produced by improved techniques. (Author)

AD-263 671 Div. 25, 8
(TIPSM/EJH) OTS price $1.10

Science and Tech. Section, Air Information Div. Washington, D. C.
ELECTRON PARAMAGNETIC RESONANCE IN SAPPHIRE.
29 Aug 61, 2p. (AID rept. 61-126; Tran. of Electron Paramagnetic Resonance of the Fe3+ Ion in Corundum. Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki 40:1594-1601, June 61)
Unclassified report

DESCRIPTORS: (*Masers, *Microwave amplifiers, Materials, Sapphires, Corundum, Atomic energy levels, Technological intelligence, USSR, Translations.) (*Sapphires, *Corundum, Iron, Ions, Paramagnetic resonance, Magnetic fields, Intensity, Atomic energy levels, Relaxation time, Spectrographic analysis, Measurement.)

This research represents a further refinement of Korniyenko's and Prokhorov's work on sapphire energy levels in their application to maser development. Their previous effort in this field was published in 1957. In 1959, G. S. Bogle and H. F. Symmons of the Commonwealth Scientific and Industrial Research Organization, Sydney, Australia, discussed the Soviet results and noted agreement with their form of the spin-Hamiltonian. The numerical results of the latest Soviet paper, however, show that the accuracy of the spin-Hamiltonian coefficients is an order of magnitude better here than in the 1957 Soviet figures or in the relevant 1959 Australian results. (Author)

AD-263 712 Div. 25
(TIPSM/EJH) OTS price $3.60

Massachusetts U., Amherst.
THE SCATTERING OF LIGHT BY ANISOTROPIC SPHERES AND DISCS,
by Richard S. Stein, Philip R. Wilson. 25 Aug 61, 31p. incl. illus. tables (Technical rept. no. 35)
(Contract Nonr-335700, Proj. 356-378)
Unclassified report

DESCRIPTORS: (*Light, Scattering, Propagation, Polarization, *Spheres, *Disks, Cylindrical bodies, Polymers, Ethylenes, Theory, Mathematical analysis, Programming.)

The results of extensive calculations for a wide range of polarizabilities of anisotropic spheres are described. Also, a theory for scattering from anisotropic disks is presented, and the results are compared with those for spheres. This latter model is applicable to the description of the scattering from truncated spherulites in thin films. It is concluded that the principal difference in scattering patterns between spheres and disks is in the sub V case. (Author)

AD-263 713 Div. 25
(TIPSP/WH) OTS price $1.60

North Carolina U., Chapel Hill.
EFFECTS OF QUENCHING AND ANNEALING ON IONIC CONDUCTIVITY AND ON DISLOCATION DECORABILITY IN SILVER CHLORIDE,
by H. Layer, M. G. Miller, and L. Slifkin. 1961, 18p. incl. illus.
(Contract AF 49(638)865)
(AFOSR-1432) Unclassified report

DESCRIPTORS: (*Silver compounds, Chlorides, *Crystals, High temperature research, Cooling.) (Silver, *Conductivity, *Ions.) (Brillouin zones, Crystals, Impurities, Silver compounds, Cadmium.) Solid state physics, Thermal stresses.

Pure silver chloride crystals, when cooled rapidly from high temperatures, show enhanced ionic conductivity which may be attributed to quenched-in Schottky defects. From the annealing out of this extra conductivity one deduces that for an associated vacancy pair the binding energy is 0.42 ev and the migration energy equals or exceeds 1.0 ev. The decorability of interior dislocations by swept-in photoelectrons is also discussed and is shown to be sensitive to the purity of the crystal. (Author)

AD-263 754 Div. 25
(TIPSP/WH) OTS price $2.60

Chicago U., Ill.
DIELECTRIC SCREENING AND SELF-CONSISTENT CRYSTAL FIELDS,
by Morrel H. Cohen and James C. Phillips. June 61, 27p. incl. illus. tables (Technical rept. no. 5)
(Contract Nonr-212122)
Unclassified report

DESCRIPTORS: (*Metals, *Semiconductors, Crystals, *Brillouin zones.) (Solid state physics, *Crystal structure, Dielectric properties.) Quantum mechanics.

The construction of self-consistent Hartree crystal potentials is discussed in terms of screening of external ionic potentials by a nearly-free valence-electron gas. An essential preliminary is the introduction of a repulsive potential which replaces the requirement of orthogonality of one-electron valence and core wave functions. Because of the excellent cancellation of core and repulsive potentials, the resulting effective ionic potential V(eff) is weak. Using an approximate dielectric constant to screen V(eff), a prescription is obtained for estimating a priori self-consistent Hartree potentials in metals and semiconductors. The dielectric screening can be extended to include exchange and correlation. Comparison with detailed band calculations for diamond, silicon and cubic boron nitride reveals the accuracy and limitations of the method. The screening of the longest wave length Fourier component of V(eff) is predicted quite satisfactorily. By studying bonding and charge transfer effects, non-linear local field corrections (crystal hybridization) are important in screening of shorter wave length Fourier components of V(eff). (Author)

AD-263 755 Div. 25
(TISPS/WH) OTS price $3.60

Chicago U., Ill.
MAGNETO-ACOUSTIC EFFECTS IN TILTED MAGNETIC FIELDS.
Doctoral thesis,
by Harold N. Spector. June 61, 38p. inc. illus. tables (Technical rept. no. 6)
(Contract Nonr-212122)
Unclassified report

DESCRIPTORS: (*Magnetic fields, *Acoustics, *Sound, Absorption, Attenuation, Ultrasonics.) Tensor analysis, Solid state physics.

It is shown that the entire Fermi surface can be mapped by using geometric resonances in the sound attenuation in tilted magnetic fields and the drift velocity of the carriers along the magnetic field simultaneously determined. The general features of the phenomena considered do not prove dependent on the particular models used in our calculations. In addition to the results specifically pertaining to tilted fields, when the assumptions of equal effective masses and relaxation times are dropped for a two band model of a semi-metal, the contribution of the two types of carriers to the ultrasonic absorption is additive. On examining the contribution to the absorption for a model of majority and minority carriers, the minority carriers dominate the attenuation when they are in the region of geometric resonances. (Author)

AD-263 777 Div. 25, 8, 30
(TIPSP/WH) OTS price $1.60

Electronics Research Lab., U. of Calif., Berkeley.
CYCLOTRON-WAVE NONCONVECTIVE INSTABILITY,
by A. W. Trivelpiece and R. J. Maxum. 1 July 61, 13p. incl. illus. (Scientific rept. no. 14; Series no. 60, Issue no. 379)
(Contract AF 19(604)2270)
(AFCRL-549) Unclassified report

Presented at the Fifth International Conference on Ionization Phenomena in Gases in Munich, 28 Aug 61.

DESCRIPTORS: (*Plasma physics, *Electron beams, Magnetic fields, Space charges.) (Electromagnetic theory, Wave transmission, *Electromagnetic waves, Waveguides.) (Equations, *Bessel functions, Transformations, Differential equations.) Electrons, Motion, Magnetic fields.

The cyclotron waves on oppositely directed interpenetrating electron beams or plasmas of finite transverse cross section in a finite axial magnetic focusing field interact to give a nonconvective or time growing instability. This instability, unlike the usual space-charge-wave nonconvective instability, is possible for physically realizable electron beams. If the d-c drift velocity of the two oppositely directed beams is slightly different, then a disturbance propagates in space as well as grows in time. In addition to the above instability, the space-charge waves of one beam can interact with the cyclotron wave on the other beam. (Author)

AD-263 784 Div. 25, 7
(TIPSP/WH) OTS price $15.00

Guggenheim Aeronautical Lab., Calif. Inst. of Tech., Pasadena.
ENERGY TRANSFER PROCESSES IN A PARTIALLY IONIZED GAS.
Rept. on Hypersonic Research Project,
by Gordon L. Cann. 15 June 61, 224p. incl. illus. tables (Memo. no. 61)
(Contract DA 04-495-ORD-1960 and DA 04-495-ORD-3231)
Unclassified report

DESCRIPTORS: (*Gas ionization, *Electric arcs, Transport properties, *Plasma physics, Diffusion, Electrons, Ions, Thermal conductivity, Magnetic fields, *High temperature research.) (Electric discharges, Gases, Argon, Electrical properties.) (Energy, Electric arcs, Electrodes, Design.)

Section I deals with an analysis of the transport properties of a partially ionized gas subject to the constraint that the average random energy of all constituent particles is exactly equal (equipartition of energy). The analysis indicates that the electron and ion diffusion velocities are more closely coupled than the equations of Chapman and Cowling show. It is shown that the only part of the thermal conductivity that can be influenced by a magnetic field is that part of the energy carried by the diffusion of the charged particles. For this reason, magnetic fields, in general, cannot be nearly as effective in reducing heat transfer rates as was previously thought. Section II deals with the development of a similarity solution for axially symmetric electric discharges. The solution is evaluated for a discharge in argon gas at one atmosphere pressure in which the temperature on the axis of the discharge varies from 6,000 K to 19,000 K. Section III is concerned with the mechanisms of energy transfer in arc jet devices. The various possible electrode configurations are discussed in detail and compared. (Author)

AD-263 792 Div. 25
(TIPSP/WH) OTS price $4.60

Metcalf Research Lab., Brown U., Providence, R. I.
CONTINUUM RADIATION FROM IONIZED RARE GASES IN REFLECTED SHOCK WAVES,
by F. W. Mies and E. F. Greene. Aug 61, 40p. incl. illus. 24 refs.
(Contract AF 49(638)167)
(AFOSR-1303) Unclassified report

DESCRIPTORS: (*Shock waves, Argon, Krypton, Xenon, Gases, Gas ionization, *Plasma physics.) (Spectrographic analysis, *Ultraviolet radiation.) (Recombination reactions, Electrons, Ions.)

A study was made of the radiation emitted by the ionized rare gases Ar, Kr, and Xe. These gases were formed in reflected shock waves in which the equilibrium temperatures ranged from 7,500-12,000 K and the electron densities from 10 to the 15th to 10 to the 18th power per cc. The intensity of the continuum radiation which is emitted throughout the visible and ultraviolet regions reached a steady state value some distance behind the reflected shock wave which corresponds to the equilibrium region predicted for the shock wave. (Author)

AD-263 794 Div. 25, 4
(TIPSP/WH) OTS price $1.10

Metcalf Research Lab., Brown U., Providence, R. I.
CHEMICAL REACTIONS IN SHOCK WAVES.
Final rept. 1 Jan 57-30 June 61,
by E. F. Greene. Aug 61, 5p. illus.
(Contract AF 49(638)167)
(AFOSR-1305) Unclassified report

DESCRIPTORS: (*Shock waves, *Chemical reactions, High temperature research.) (*Hydrogen compounds, Bromides, Iodides, Reaction kinetics, Molecules.) Spectrographic analysis.

AD-263 805 Div. 25
(TIPSP/GRW) OTS price $11.00

Maryland U., College Park.
THEORY OF SPIN WAVE INTERACTIONS IN FERROMAGNETISM.
July 1961, 145p. 24 refs. (Technical rept. no. 222)
(Contract AF 49(638)399)
(AFOSR 1331) Unclassified report

DESCRIPTORS: (*Ferromagnetism, Nuclear spins, Magnetism.) (Cryogenics, Solid state physics.) *Quantum statistics.

The interactions of spin waves in an ideal Heisenberg model of a ferromagnet are studied. In particular, the effect of spin wave interactions on the free energy and spontaneous magnetization are examined. Treating a spin wave as a local phenomena, only binary collisions between spin waves need be considered at low temperature. The free energy of the system is developed as an expansion in terms of a binary kernal function; this binary kernal function is determined from the two particle propagator, which can formally be evaluated. When the free energy expansion is evaluated, the results of Dyson are obtained. That is, the lowest order correction term introduced in the spontaneous magnetization by spin wave interactions is of order T(4). (Author)

AD-263 807 Div. 25, 15
(TIPSP/WH) OTS price $1.60

Maryland U., College Park.
PITCH ANGLE DIFFUSION IN A MAGNETIC MIRROR GEOMETRY.
by R. C. Wentworth and W. M. MacDonald. July 61, 12p. (Technical rept. no. 220)
(Contracts AF 49(638)530 and Nonr 1797(00))
(AFOSR 1345) Unclassified report

Presented at the Annual meeting of the American Physical Society, New York, Feb. 1-4, 1961.

DESCRIPTORS: (*Terrestrial magnetism, *Electrons, Diffusion, Scattering.) (*Magnetic fields, Particles, Transport properties.) (Mathematical analysis, Equations.) Probability.

The diffusion in pitch angle produced by Coulomb collisions of charged particles in a magnetic mirror was discussed using a variety of distribution functions and corresponding diffusion equations. A new derivation of an appropriate diffusion equation is presented by considering the random motion of particles on a sphere in momentum space. The effect of scattering at diffenent points of the periodic particle orbit must be considered and leads to corrections on this problem. One result is that with a reflecting barrier instead of a loss-cone, the equilibrium flux tends toward an isotropic pitch angle distribution. (Author)

AD-263 834 Div. 25, 9, 30
(TIPSP/GRW) OTS price $3.60

Polytechnic Inst. of Brooklyn, N. Y.
ELECTROMAGNETIC EFFECTS OF A STRONG SHOCK WAVE MOVING IN A WAVEGUIDE OF FINITE LENGTH.
Rept. on Energy Transfer to Surface Through Ionized Shock Waves,
by Manlio Abele. Aug 61, 47p. incl. illus. tables.
(PIBAL Rept. no. 703)
(Contract AF 30(602)2045, Proj. 5561)
(RADC TN 61-186) Unclassified report

DESCRIPTORS: (*Shock waves, *Shock tubes, *Electromagnetic effects, Electromagnetic properties.) (Cavity resonators, Wave transmission, Electromagnetic wave reflections.) (Magnetohydrodynamics, Plasma physics, Waveguides.)

The electromagnetic properties of a closed metallic shock tube are analyzed with the assumption that the electrical conductivity of the gas behind the moving shock is large enough to produce a strong reflection of the electromagnetic wave. The section of the shock tube limited by the moving shock wave behaves like a resonant cavity of variable length. The effects of the shock velocity upon the resonant conditions of the cavity are analyzed. (Author)

AD-263 835 Div. 25
(TIPSP/WH) OTS price $6.60

Polytechnic Inst. of Brooklyn, N. Y.
BIOT'S VARIATIONAL PRINCIPLE IN HEAT CONDUCTION,
by Thomas J. Lardner and Frederick V. Pohle.
July 61, 61p. incl. illus. 54 refs. (PIBAL rept. no. 595)
(Contract AF 49(638)302; Proj. 9782)
(AFOSR 1275) Unclassified report

DESCRIPTORS: (*Heat transfer, *Thermodynamics, Elasticity, Entropy, *Conductivity.) (Mathematical analysis, Equations of state.) Aerodynamic heating.

The literature on Biot's variational principle for heat conduction and the thermodynamic foundations of the pninciple are reviewed. An additional example treats the heating of slabs exposed to time-dependent heat fluxes. A specific example of a triangular heat pulse is presented in detail. (Author)

AD-263 843 Div. 25
(TIPSP/MA) OTS price $1.60

Illinois U., Urbana.
SCATTERING OF LOW ENERGY K(-)-MESONS BY NUCLEI.
by J. H. Hetherington and D. G. Ravenhall. 1961
11p. incl. illus.
(Sponsored by Office of Naval Research)
Unclassified report

DESCRIPTORS: (*Nuclear physics, Nuclear structure, *Nuclear spins.) (*Scattering, Particles, Nuclear energy.) (*Mesons, Nucleons, Protons.) (Equations, Integrals, Integral transforms, Fourier analysis.)

Calculations are given for linking the low-energy K(-)-proton scattering amplitudes with the optical potential for K(-)-mesons in nuclei. The basic calculation is of the optical potential U (single particle potential) of a meson in nuclear matter.

AD-263 845 Div. 25
(TIPSP/MA) OTS price $8.10

Illinois U., Urbana.
A NUMERICAL SOLUTION FOR THE TRANSIENT STRAIN DISTRIBUTION IN A RECTANGULAR PLATE WITH A PROPAGATING CRACK.
Progress rept. no. 5 on Proj. SR-137,
by M. P. Gaus. 5 Sep 61, 78p. incl. illus. tables. (Ship structure Committee Serial no. SSC-129)
(Contract NObs-65790; In cooperation with Committee on Ship Structure, National Research Council, Contract NObs-72046)
Unclassified report

DESCRIPTORS: (*Fracture (Mechanics), *Numerical analysis.) (*Sheets, Vibration, Deformation, Plasticity, Shear stresses, Rupture, Mathematical analysis, Stresses.) (Simulation, Solids, Wave transmission, Lattices, Rods, Elasticity, Differential equations.)

A physical lattice model that approximates a continuous material be reducing it to a series of rigid bars and deformable connections is used to investigate the transient-strain redistribution associated with a crack propagating through a rectangular plate. Equations are developed for equilibrium of the lattice model in terms of displacements using plane-stress conditions. A complete set of equations is given to cover all cases of boundary conditions that ordinarily would be encountered in applications of the lattice model. Results of several examples of statically loaded plates analyzed with the lattice model show excellent agreement when compared with an energy method solution. The differential equations expressing the dynamic behavior of the lattice model are developed, and numerical solution of these equations is discussed. Examples are given of application of these equations to a steady-state condition and the calculation of natural frequencies of lattice models. Several examples of the transient-strain redistribution associated with a crack propagating through a plate in finite jumps are presented. (Author)

AD-263 846 Div. 25, 2, 4
(TIPSP/GRW) OTS price $2.60

Air Force Cambridge Research Labs., Bedford, Mass.
NEW VACUUM ULTRAVIOLET EMISSION CONTINUA IN THE RARE GASES,
by R. E. Huffman, W. W. Hunt, and others.
July 61, 17p. incl. illus. table (GRD Research notes no. 61; AFCRL-663)
(Proj. 7653; In cooperation with Device Development Corp., Weston, Mass.)
Unclassified report

DESCRIPTORS: (*Rare gases, *Ultraviolet spectroscopy, *Photochemistry.) (*Upper atmosphere, Helium, Argon, Xenon, Ultraviolet radiation, Absorption, Spectrographic analysis.) Recording devices, Vacuum systems.

Several new vacuum ultraviolet-emission continua recently observed in the spectra of the rare gases helium, argon, and xenon are discussed. These spectra were produced with a windowless light source operated as a repetitive condensed discharge and equipped with a differential pumping system to separate the high pressure (up to 800 mm Hg of helium) light source from the 2-m vacuum spectrograph (pressure 1/1000 mm Hg). In helium two continua were observed at pressures above 150 mm in addition to the weaker 600 to 950 angstroms continuum. The brightest extends from about 1050 to above 4000 angstroms and seems connected with greatly enhanced lines of He(II). The other continuum is the completely broadened principal series extending from 584 to about 510 angstroms and containing broadened principal series absorption lines. With argon in a flow system or xenon isolated with a LiF window, previously observed continua were extended from their resonance lines to beyond 3000 angstroms. Details of the experimental observations and possible explanations of these continua are presented. (Author)

26. PRODUCTION AND MANAGEMENT

AD-263 849 Div. 25
(TIPSP/WH) OTS price $7.60

Microwave Lab., Stanford U., Calif.
OSCILLATIONS AND NOISE IN LOW-PRESSURE DC DISCHARGES,
by F. W. Crawford and G. S. Kino. June 61, 69p. incl. illus. 227 refs. (Scientific rept. no. 33; ML rept. no. 817)
(Contract AF 19(604)1930)
(AFCRL-564) Unclassified report

DESCRIPTORS: (*Plasma physics, *Plasma oscillations, *Electric discharges, Direct current, Oscillations, Noise (Radio), High frequency, Low frequency.) (Microwaves, Propagation.) Gas discharges.

This analysis is concerned mainly with oscillations and fluctuations which occur either spontaneously, or as a result of deliberate excitation, in low-pressure, hot-cathode plasmas. Experimental observations on high and low frequency effects occurring spontaneously are discussed, and speculations are made on the possible generation mechanisms. In many cases, theories of these mechanisms have been treated in experiments involving deliberate excitation of oscillations, and comparisons are made where relevant. For device applications, and to relieve the difficulties which occur in quantitative experiments in plasma physics, it is important that the sources of spontaneous oscillations should be understood and suppressed if possible. The analysis includes a discussion of work which has been carried out to reduce these effects, and concludes with some suggestions for further lines of attack on the problems. (Author)

AD-263 858 Div. 25, 30, 8
(TIPSM/BRW) OTS price $6.60

Laboratory for Insulation Research, Mass. Inst. of Tech., Cambridge.
(No Title).
Progress rept. no. 29.
July 61, 62p. incl. illus. tables, 60 refs.
(Contracts Nonr-184110, Proj. NR-018-801, AF 19(604)5482, AF 19(604)6155, AF 33(604)5920, and AF 33(616)8353)
Unclassified report

DESCRIPTORS: (*Ferroelectric crystals, *Dielectrics, Single crystals, Crystals, Ferrites, Sapphires, Garnet, Titanium compounds, Oxides, Fluorides, Barium compounds, Titanates, Alkali metal compounds, Halides, Preparation, Synthesis, Growth, Dielectric properties, Electrical properties, Magnetic properties, Ferroelectricity.) (Magnetometers, Mass spectrometers, Design.) Physical properties, Thermoelectricity, Chemical analysis, Magnetostriction.

Contents:
Materials analysis and synthesis
Crystal physics
Preparation of polycrystalline samples
High-temperature dielectrics
Electric dipoles in condensed systems
Conduction, field emission, and breakdown
Magnetic spectroscopy
Magnetics

AD-263 271 Div. 26, 27, 14
(TIPSM/SEB) OTS price $9.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
REINFORCED PLASTICS FOR PRESSURE VESSELS AND ROCKET MOTOR CASES, AN ANNOTATED BIBLIOGRAPHY,
by A. A. Beltran. June 61, 115p. 217 refs.
(Special Bibliography no. SB-61-32; Rept. no. 5-73-61-3)
Unclassified report

DESCRIPTORS: (*Bibliography, *Filament wound construction, Wire winding machines, *Rocket cases, *Pressure vessels.) (Fibers, Plastics, Laminates, *Reinforcing materials, Filament wound construction, Physical properties, Mechanical properties, Industrial equipment, Production.) (Test methods, Non-destructive testing, Quality control.)

The annotated bibliography presents the literature on the applications of filament wound structures to rockets and missiles. The bibliography begins with the literature on development, production and properties of fibers; filament winding methods and equipment; and research and development of reinforced plastics. The next section covers nondestructive testing, quality control, and test methods in general. This is followed by the mechanical and physical properties of reinforced plastics. The applications of filament wound structures to pressure vessels, particularly rocket motor cases, conclude the bibliography. Arrangement within each division is alphabetical by author. An author index and a corporate author-report index have been included. (Author)

AD-263 298 Div. 26, 14
(TIPSM/BRW) OTS price $1.10

Aeronautical Materials Lab., Naval Air Material Center, Philadelphia, Pa.
MIL-F-22191 (AER) QUALIFICATION TEST RESULTS ON THE RAP-IN-WAX COMPANY PRODUCT FILM-O-RAP 5500,
by E. J. Lion. 20 Apr 61, 1p. (Rept. no. NAMC-AML-1230)
Unclassified report

DESCRIPTORS: *Packaging, Materials, Films, Thin films, Ethylenes, Esters, Polymers, Military requirements, Specifications, Tests, Seals, Storage.

The test results indicate that the transparent material, designated Film-O-Rap 5500, is in conformance with the Type II requirements of MIL-F-22191 (Aer) except the one year storage which will be completed March 1962. The sealing conditions are as follows: 350 F, 30 psi, 3-sec dwell time for Packaging Industries, Inc., Portable Heat Sealer, Model 6, 1.5-sec impulse time, 3.0-sec cooling time, 30% of nominal 110 v, 25-lb line pressure, 30 psi effective jaw pressure for Packaging Industries, Inc., Impulse Sealer, Model 12SC and a dial setting of 8 for Vertrod Corporation, Impulse Sealer, Model 13A. (Author)

AD-263 299 Div. 26, 14
(TIPSM/BRW) OTS price $1.10

Aeronautical Materials Lab., Naval Air Material Center, Philadelphia, Pa.
MIL-F-22191(AER) QUALIFICATION TEST RESULTS ON THE GENERAL CHEMICAL DIVISION, ALLIED CHEMICAL

CORPORATION PRODUCT ACLAR 191 AFTER A ONE YEAR STORAGE PERIOD,
by I. H. Custis. 4 May 61, 3p. incl. table.
(Rept. no. NAMC-AML-1241)
Unclassified report

DESCRIPTORS: *Packaging, Materials, Films, Thin films, Military requirements, Specifications, Tests, Seals, Storage.

The results of tests on Aclar-191 (Allied Chemical Corporation) indicate that the material conforms to the requirements of MIL-F-22191(Aer) after a one year storage period. The sealing conditions used to effect satisfactory seals were 375 F, 20 psi, 3-sec dwell time for Packaging Industries, Inc., Portable Heat Sealer Model 6, 1.5-sec impulse time, 3.0-sec cooling time, 25% of normal 110, 25-lb line pressure, 30 psi effective jaw pressure for Impulse Sealer Model 12SC and a dial setting of 6 for Vertrod Corporation, Impulse Sealer Model 13A. (Author)

AD-263 307 Div. 26, 1
(TIPSE/NTM) OTS price $1.10

Aeronautical Materials Lab., Naval Air Material Center, Philadelphia, Pa.
INVESTIGATION OF CYLINDERS, COMPRESSED GAS, NON-SHATTERABLE. TOM KINCAID AND COMPANY, DAYTON 9, OHIO,
BY A. E. Simkins. 7 June 61, 2p. incl. table.
(Rept. no. NAMC-AML-22147-61)
Unclassified report

DESCRIPTORS: *Gas cylinders, Specifications, Quality control, Experimental data, Tests, Test methods.

AD-263 528 Div. 26
(TIPSM/EJH) OTS price $8.10

Chemical Corp., Springfield, Mass.
RESEARCH AND DEVELOPMENT IN ION EXCHANGER METHODS.
Final rept.,
by William C. Jones. 25 Sep 61, 40p. incl. tables.
(Contract DA 19-020-504-ORD-4934)
Unclassified report

DESCRIPTORS: (*Chromium plating, Plating, Solutions, Electrolytes, Contamination, Iron, Chromium, Ions, Sulfates, Oxides, Determination, Tests.) (*Ion exchange resins, Industrial equipment, Polymers, Styrenes, Vinyl radicals, Benzenes, Solutions, Purification.) (Solutions, Chemical impurities, Determination, Tests, Test methods, Conductivity, Hydrogen ion concentration, Density, Viscosity, Spectrographic analysis.)

Methods of determining the contamination of chromium plating solutions with chromium (3+) ions, iron and sulfates are discussed. These include conductivity, pH, specific gravity, viscosity, optical density measurements, and precipitation. Specific recommendations for improved column operation and selection of Amberlite 200 as the resin for the ion exchange column at the Springfield Armory are reported.

AD-263 601 Div. 26, 17
(TIPSM/BRW) OTS price $5.60

General Dynamics/Convair, San Diego, Calif.
HIGH ENERGY IMPACT FORMING PROGRAM. STATE OF THE ART SURVEY.
Phase 1 rept., 8 June-8 Aug 61,
by Robert A. Kaser. Aug 61, 53p. incl. illus. 47 refs.
(Contract AF 33(600)43035, Proj. 7-848)
(ASD TR 7-848, vol. 1) Unclassified report

DESCRIPTORS: (Sheets, *Metal forming presses, Impact shock, Rubber, Synthetic rubber, Shock resistance, Velocity, Pressure.) *Explosive forming, Hydraulic presses, Pneumatic systems.

The state-of-the-art of rubber pad forming of sheet materials at velocities greater than those produced by the usual drop hammer or hydraulic press was investigated. No current programs were discovered. Some work is being done at increased pressures on the workpiece with existing equipment but no work was being done at velocities greater than 50 fps because of the limitations of existing rubber pad forming equipment. Previous work is described with particular attention to the type of equipment, and the instrumentation used. The work to be done in the second phase of the program using existing General Dynamics Corporation high energy rate machines capable of operating at the necessary high velocities is outlined. (Author)

AD-263 872 Div. 26, 17
(TIPSM/EET) OTS price $6.60

Aeroprojects, Inc., West Chester, Pa.
DEVELOPMENT OF ULTRASONIC WELDING EQUIPMENT FOR REFRACTORY METALS.
Interim technical engineering rept. 1 June-31 Aug 61,
by J. Byron Jones, Nicholas Maropis, and others.
Sep 61, 65p. incl. illus. tables, 78 refs.
(Contract AF 33(600)43026, Proj. 7-888)
(ASD TR 7-888, vol. 1) Unclassified report

DESCRIPTORS: (*Welding, *Ultrasonics, Heat resistant alloys, Refractory materials, Metals, Sheets, Metal plates, Energy, Transducers.) (*Welded joints, Steel, Nickel alloys, Chromium alloys, Iron alloys, Cobalt alloys, Molybdenum alloys, Titanium alloys, Aluminum alloys, Tantalum, Tungsten, Niobium alloys, Mechanical properties, Physical properties.)

Joining refractory and superalloy metals in thicknesses up to 0.10 in. by ultrasonic welding is feasible. A first approximation of the acoustical energy required indicates that the requisite welding equipment is also feasible. The report is a compilation and discussion of information pertinent to the development of ultrasonic welding equipment for joining AM-355 steel, Inconel X, Rene 41, W, Mo-0.5% Ti, and Nb alloy (duPont D-31). The feasibility of welding the materials and gages of interest is supported by data, appropriately referenced, from previous work with thinner material. Information on transducer, coupler, and tip materials is presented with information on evaluating efficiency and practicability. Design information on spot-type and roller-seam welding machine tips is presented. Data on various properties of the weldment materials are tabulated. (Author)

AD-263 874 Div. 26, 27
(TIPSM/EET) OTS price $7.60

Ingersoll Kalamazoo Div., Borg-Warner Corp., Mich.
FABRICATION OF LARGE DIAMETER TITANIUM PRESSURE VESSELS BY THE SPIRAL WRAP METHOD.

Rept. no. 3, 1 Apr-30 June 61,
by R. E. Angerman. 15 July 61, 76p. incl. illus. tables.
(Contract DA 20-018-ORD-22890)
Unclassified report

DESCRIPTORS: (Rocket motors, *Rocket cases, Pressure vessels, *Manufacturing methods, Filament-wound construction, Sheets, Laminates, Steel, Titanium, Titanium alloys, Plastics, Bonding, Adhesives, Thermosetting resins, Phenolic resins, Hydrostatic pressure, Vibration, Tests, Non-destructive testing.)

A portion of the second series of 18 steel tubular specimens were fabricated and tested. The 9 specimens to be used for aging tests and the control specimen for that series were completed and hydrostatically inspected at a proof pressure which would give a strength to density ratio of one million in the tube section. The changes in manufacturing techniques and tooling to make this possible are reviewed. An inspection technique is discussed which may lead to a non-destructive method of determining the structural soundness of a helically wound tube. A review of the engineering, tooling design and material evaluation leading to the fabrication of 20 and 40-inch diameter specimens is presented. (Author)

27. PROPULSION SYSTEMS

AD-263 100 Div. 27, 12
(TIPSM/EET) OTS price $4.60

Jet Propulsion Center, Purdue U., Lafayette, Ind.
A STUDY OF THERMAL ARC-JET PROPULSION.
Interim rept. 1 June 59-1 Mar 61,
by J. G. Skifstad. Aug 61, 41p. incl. illus. tables, 27 refs. (Rept. no. I-61-2)
(Contract Nonr-110017)
Unclassified report

DESCRIPTORS: (*Electric propulsion, Plasma jets, Electric arcs, Electric discharges, Gas discharges.) (*Spaceships, Space flight, Propulsion, Electric propulsion.) (*Exhaust gases, Argon, Helium, Jets.) (*Laboratory equipment, Combustion chambers, Plasma jets, Electric arcs, Simulation.)

Experimental investigations of certain aspects of thermal arc-jet propulsion are discussed for convenience of presentation, the work is discussed under the following headings: (1) The D. C. Power Supply; (2) The First Experimental Arc Chamber; (3) The Experimental Apparatus for the Present Research Program; (4) Preliminary Analytical Investigation; (5) Literature Survey; and (6) Memorandum on Propulsion Requirements for Space Flight. (Author)

AD-263 118 Div. 27, 10, 14, 30
(TIPSM/EJH) OTS price $1.10

Stanford Research Inst., Menlo Park, Calif.
TUNGSTEN AND ROCKET MOTORS.
Progress rept. no. 15 for period ending Aug 61,
by David S. Bloom. 6 Sep 61, 6p. incl. illus. tables.
(Contract NOrd-18619)
Unclassified report

DESCRIPTORS: (*Rocket motors, *Solid rocket propellants, *Rocket motor nozzles, Materials, Refractory materials, Tungsten, Exhaust gases, Erosion, Ablation, Melting, Thermal stresses.) (*Plasma jets, Flare spraying, Aluminum compounds, Oxides, Particles, Erosion, Exhaust gases, Simulation.)

Spraying of alumina particles at low levels in the plasma-jet rocket exhaust simulator is reported. The alumina was introduced through the hollow rear electrode at relatively high flow rates using Ar as the carrier gas. No melting of the alumina was observed under these conditions, however, partial melting of the alumina particles was achieved at higher power levels with approximately the same alumina flow rates. The following modifications in the thermal shock apparatus were made to obtain an initial heating rate more nearly simulating that of a rocket nozzle in an actual firing: (1) graphite heater elements were used in the thermal shock apparatus; and (2) test specimens were dropped over the heater elements after they reached a high temperature. A recrystallized alumina ring was covered with a crack network after a 2-sec shock test in the apparatus.

AD-263 186 Div. 27
(TIPSP/GRW) OTS price $13.50

Martin Co., Baltimore, Md.
PM-1 AIR-COOLED CONDENSER TEST,
by M. B. Eck and J. F. Holliday. Aug 61, 196p. incl. illus. tables.
(Contract AF 29(601)4301)
(AFSWC TN 61-33) Unclassified report

DESCRIPTORS: (*Steam condensers, Construction, Design, Tests, Test equipment.) (Pressure, Temperature control, Tables.) (Nuclear power plants, *Thermal utilization.) (Boiler tubes, Air cooled.)

A single module of the PM-1 four-module condensing system was tested over an ambient temperature range of +70 to -65 F at the Climatic Laboratory of the 3208th Test Group at Eglin Air Force Base during the period between January 3, 1961 and March 10, 1961. All modes of normal operation, transportation and handling, as well as some emergency conditions, were imposed on this condenser section. The unit was shown to have an adequate margin of safety in all of its design parameters. The total power requirement for the design heat load, when extrapolated to 6500 ft elevation was 10% less than predicted. (Author)

AD-263 340 Div. 27, 17, 26, 12
(TIPSM/BRW) OTS price $1.60

Mellon Inst. of Industrial Research, Pittsburgh, Pa.
THE EVOLUTION OF ULTRA-HIGH STRENGTH STEELS, AND RESEARCH ON MATERIALS AND VARIOUS NOVEL TECHNIQUES OF FABRICATION OF HIGH PERFORMANCE ROCKET MOTOR CASES.
Progress rept. no. 40, 1-31 Aug 61,
by G. K. Bhat. 31 Aug 61, 18p. incl. illus. tables.
(Contract NOrd-18169, Proj. no. 381-3)
Unclassified report

DESCRIPTORS: (*Rocket cases, Materials, Manufacturing methods, Processing.) (*Beryllium, Wire, Drawing (Machine processing), Tensile properties.) (*Rocket cases, Filament wound construction, Aluminum wire, Bonding, Epoxy resins.) (*Steel, Tensile properties, Fracture (Mechanics), Stresses, Corrosion, Surface properties, Plastic flow, Tests.)

AD-263 469 Div. 27, 17, 12
(TIPSM/BRW) OTS price $22.25

Aerojet-General Corp., Sacramento, Calif.
INVESTIGATION OF THE STRUCTURAL INTEGRITY OF 37.5-IN.-DIA SUBSCALE MINUTEMAN CHAMBERS OF LADISH D-6ac STEEL,
by E. L. Sigrist and F. H. Meissner. 20 Sep 61, 484p. incl. illus. tables.
(Contract AF 33(600)36610)
(AFBSD TN 61-15) Unclassified report

DESCRIPTORS: (*Rocket cases, *Steel, Stresses, Deformation, Hydrostatic pressure, Rupture, Tests.) (*Guided missiles, Surface to surface, Rocket propulsion, Rocket motors, Solid rocket propellants, Rocket cases, Materials, Design.)

A subscale 37.5-in.-diam Minuteman chamber fabricated of Ladish D-6ac steel was subjected to a series of tests to demonstrate the structural integrity of the case and to obtain data applicable to the second-stage Minuteman engine case. The magnitude and direction of stresses in the aft closure and chamber were determined, an investigation was made of chamber deflection, blast tube rotation about the longitudinal axis of the chamber, and chamber expansion under ambient temperature and an internal pressure of 600 psi. Stresses in the forward closure were determined, and tests were made to determine the magnitude and direction of the principal strains at ambient and elevated temperatures as pressure was gradually increased until the chamber burst. Data obtained in the test series, together with measurements of wall thickness and radii of curvature, indicate that Ladish D-6ac steel chambers of this design are structurally sound. (Author)

AD-263 475 Div. 27, 14
(TIPSM/BRW) OTS price $2.60

Atlantic Research Corp., Alexandria, Va.
IMPROVEMENT OF THE USEFULNESS OF PYROLYTIC GRAPHITE IN ROCKET MOTOR APPLICATIONS.
Quarterly progress rept. for June-Aug 61, by J. D. Batchelor, S. W. McCormick and others. 15 Sep 61, 25p. incl. illus. tables.
(Contract DA-36-034-ORD-3279, Proj. TB4-004)
Unclassified report

DESCRIPTORS: Solid rocket propellants, *Rocket motor nozzles, *Graphite, Coatings, Refractory coatings, Hydrocarbons, Pyrolysis, Carbon deposits, Processing, Production, Manufacturing methods, Physical properties, Microstructure, Thermal stresses, Stresses, Mathematical analysis, Design, Tests.

The effect of the gas dynamics on the uniformity of the pyrolytic graphite deposit was noted. A derivation was completed for the exact stress-strain relations for a material which exhibits the form of elastic and thermal anisotropy found in pyrolytic graphite. The over-all problem of stress-strain in a cylinder of finite length was then set up. The problem was separated into two parts, one dealing with the central portion of the cylinder and other dealing with the end effects. A pyrolytic graphite test piece having a coarse-grained microstructure was successfully tested in a 60-sec firing with Arcite 373 (5600 F) propellant. A segmented nozzle was used in which the test piece was a concentric ring in the throat. The segmented test nozzle was then redesigned to use a larger, contoured section of pyrolytic graphite at the throat. Redesign was necessary for hotter firings (6500 F) since no other grade of graphite is serviceable near the throat section under such demanding conditions. (Author)

AD-263 553 Div. 27, 4, 10
(TIPSM/LK) OTS price $6.60

General Dynamics/Convair, San Diego, Calif.
STUDY PROPOSAL: GAS PHASE CHEMICAL KINETIC PHENOMENA.
Aug 61, 64p. incl. incl. tables, 78 refs.
(Rept. no. ZJ-058)
Unclassified report

DESCRIPTORS: (*Reaction kinetics, *Plasma jets, *Hydrogen, Gases, Chemical reactions, Dissociation, Recombination reactions, High temperature research, Low pressure research, Laboratory equipment.) (*Hydrogen, *Gases, Dissociation, Atoms, Recombination reactions, Chemical reactions, Catalysis, Catalysts, Plasma physics, Reaction kinetics, Theory, Test equipment, Test methods.) (*Rocket propulsion, Hydrogen, Plasma jets, Reaction kinetics.)

A study of the ability of foreign materials to catalyze gas-phase chemical reactions that are usually third order, is a promising approach yet to be exploited for obtaining a fundamental understanding of basic chemical reaction processes, and the evaluation of lifetimes of activated complexes. This basic information is applicable to the development of advanced thermal propulsion devices, hypersonic reentry vehicles, and an understanding of exoatmospheric chemistry. (Author)

AD-263 576 Div. 27, 17
(TIPSM/BRW) OTS price $1.60

Naval Research Lab., Washington, D. C.
RESISTANCE TO CRACK PROPAGATION OF HIGH STRENGTH MATERIALS FOR ROCKET MOTOR CASINGS.
Quarterly status rept. no. 1, 1 July-30 Sep 61, by John E. Srawley. 30 Sep 61, 16p. incl. tables.
(Proj. TB 4-004)
Unclassified report

DESCRIPTORS: (*Sheets, *Rocket cases, Materials, Steel, Titanium alloys, Fracture (Mechanics), Tensile properties, Mechanical properties, Fractography, Microstructure, Electron microscopy.)

Progress is reported on the preliminary screening of high strength sheet materials for rocket cases. The resistance to crack propagation as determined by center-crack-slotted tensile specimens is the basis for selection. The materials include commercially available high-strength steels and Ti alloys, experimental alloys offered by producers, and experimental steels made at NRL. Factors considered are strength level and heat treatment variables, thickness, orientation with respect to direction of working, and testing temperature. The measure of crack propagation resistance is taken as the ratio of the nominal net fracture stress of the standard specimen to the yield strength, R. Generally the results for a given material and condition (heat treatment) were obtained at room temperature

(80 to 90 F) and at 0 and/or 200 F; some results were also obtained at -300 to 600 F. The R equals 0.7 minimum was considered conservative for careful roll-formed and welded construction. To complement the testing program, electron microscopy was used to study replicas of fracture surfaces and of polished and etched micro-sections.

AD-263 594 Div. 27
(TIPSM/BRW) OTS price $9.60

Curtiss-Wright Corp., Quehanna, Pa.
LIQUID METAL REGENERATOR FEASIBILITY STUDY FOR A LIGHT-WEIGHT TURBOSHAFT ENGINE,
by John R. Ferris. Apr 61, 113p. incl. illus. tables.
(Contract DA 44-177-tc-687, Proj. 9R38-01-020-08)
(TREC TR 61-46) Unclassified report

DESCRIPTORS: (Airplane engines, Helicopter engines, Gas turbines, *Gas turbine regenerators, *Heat exchangers, *Liquid metals, Sodium alloys, Potassium alloys, Feasibility studies.) (*Heat exchangers, Heat transfer, Exhaust gases, Compressed air, Compressors, Design, Tests, Fuel consumption, Effectiveness.)

Feasibility was shown for the use of a liquid-metal-coupled regenerator incorporated in a 7:1-pressure-ratio, 1000-hp turboshaft study engine. The weight of the regenerator for 0.525 over-all effectiveness is 235 lb. The increase in the engine weight resulting from incorporating this regenerator in the powerplant system is 303 lb. The regenerator design weights are based on current state-of-the-art materials and fabrication techniques for the heat exchanger elements. Use of thin fin material, available before the end of the year would reduce the weight of the heat exchanger to 200 lb. No attempt was made to optimize the engine cycle or powerplant configuration to minimize regenerator weight. The performance of the study engine with regeneration includes the attractive specific fuel consumption at 100% power of 0.446 lb/hp hr, and below 0.55 lb/hp hr to 40% rated power. Detail performance calculations were made to support the feasibility of this regenerator-engine composite. (Author)

AD-263 599 Div. 27, 14
(TIPSM/BRW) OTS price $1.60

General Electric Co., Cincinnati, Ohio.
FABRICATION OF PYROLYTIC GRAPHITE ROCKET NOZZLE COMPONENTS.
Monthly progress rept. for July 61,
by R. E. Viventi. 8 Aug 61, 9p. (Rept. no. DM 61-252)
(Contract NOw 61-0161-c)
Unclassified report

DESCRIPTORS: (*Rocket motor nozzles, Refractory materials, Refractory coatings, *Graphite, Production, Manufacturing methods, Hydrocarbons, Pyrolysis, Carbon deposits, Failure (Mechanics), Machining.)

Progress in the manufacture of pyrolytic graphite nozzle inserts is described. Residual stresses in the subscale inserts remain a problem because of the thickness to radius of curvature ratios. Completing these inserts successfully without cracks is unlikely. Emphasis will be placed on completing full scale components. (Author)

AD-263 600 Div. 27, 14
(TIPSM/BRW) OTS price $1.60

General Electric Co., Cincinnati, Ohio.
FABRICATION OF PYROLYTIC GRAPHITE ROCKET NOZZLE COMPONENTS.
Progress rept. for June 61,
by R. E. Viventi and G. S. Hoppin, III.
13 July 61, 11p. incl. tables (Rept. no. DM61-237)
(Contract NOw 61-0161-c)
Unclassified report

DESCRIPTORS: (*Rocket motor nozzles, Refractory materials, Refractory coatings, *Graphite, Production, Manufacturing methods, Hydrocarbons, Pyrolysis, Carbon deposits, Failure (Mechanics), Machining.)

Progress is reported on the manufacture of pyrolytic graphite nozzle inserts. The problems associated with machining of free standing pyrolytic graphite liners remain unsolved. Effort was directed toward optimizing holding fixtures and improving machining techniques. (Author)

AD-263 618 Div. 27
(TIPSM/BRW) OTS price $4.60

Pennsylvania State U., University Park.
CONTINUOUS BIBLIOGRAPHY ON COMPRESSION IGNITION ENGINES LOW TEMPERATURE PROBLEMS.
1st Edition,
by W. E. Meyer. 1961, 43p.
(Contract DA 36-034-ORD-3199)
Unclassified report

DESCRIPTORS: (*Bibliography, Diesel engines.) (*Diesel engines, Starting, Engine primers, Fuel oil, Fuel systems, Combustion, Fuels, Heaters, Heating, Heat transfer, Ignition, Coolants, Cooling, Lubricants, Lubrication, Greases, Specifications, Test facilities.)

Author and subject index lists are presented of all headings for 240 abstract cards on the subject of low temperature problems of compression ignition engines. The entries are listed by author or issuing agency, date of publication, journal or report identification, and the identification number under which certain reports are obtainable from ASTIA or similar sources. It is expected that this index will be issued annually with such additions as are occasioned by the issue of supplementary abstract cards. (Author)

AD-263 720 Div. 27, 17, 12
(TIPSM/EET) OTS price $19.75

Aerojet-General Corp., Sacramento, Calif.
INVESTIGATION OF THE STRUCTURAL INTEGRITY OF SECOND-STAGE MINUTEMAN CHAMBERS OF LADISH D-6ac STEEL,
by E. L. Sigrist and F. H. Meissner. 20 Sep 61, 311p. incl. illus. table.
(Contract AF 33(600)36610)
(AFBSD TN 61-16) Unclassified report

DESCRIPTORS: (Guided missiles, Surface to surface, Staging, *Rocket cases, *Steel, Stresses, Deflection, Deformation, Load distribution, Hydrostatic pressure, Tests, Test methods, Specifications.)

Second-stage Minuteman chambers fabricated of Ladish D-6ac steel were subjected to hydrostatic tests to investigate the structural soundness of the cases. The test series was conducted in four phases. Test data obtained at pressures ranging from 0 to 600 psig indicated that cham-

bers fabricated of this material meet specifications pertaining to structural integrity. (Author)

28. PSYCHOLOGY AND HUMAN ENGINEERING

AD-263 211 Div. 28, 32
(TIPSB/LH) OTS price $9.60

Human Sciences Research, Inc., Arlington, Va.
SOCIAL PHENOMENA IN A POST-NUCLEAR ATTACK SITUATION. SYNOPSES OF LIKELY SOCIAL EFFECTS OF THE PHYSICAL DAMAGE,
by Peter G. Nordlie and Robert D. Popper. Aug 61, 117p. incl. illus. tables (Rept. no. HSR-RR-61/2-Se)
(Contract AF 49(638)549, Proj. 9779)
(AFOSR TN 60-1495) Unclassified report

DESCRIPTORS: *Nuclear explosions, *Explosion damage, *Sociology, Attitudes, Behavior, *Reaction (Psychology), Theory.

This report examines the effect of major disasters on the behavior of people with a view to generating hypotheses, assumptions, and variables to be used in the formulation of a system for predicting the recovery of a social system from a nuclear attack. The ultimate aim of the research program is a predictive system or model which has applicability to any large modern industrialized society. (Author)

AD-263 241 Div. 28
(TIPSB/MS) OTS price $1.60

Naval Personnel Research Field Activity, Washington, D. C.
PREDICTION OF PERFORMANCE AMONG LOWER APTITUDE MEN,
by David Kipnis. July 61, 13p. incl. illus. tables (Technical bull. no. 61-10)
Unclassified report

DESCRIPTORS: (*Psychomotor tests, Aptitude tests, Needs, Measurement.)

The purpose of the study was to investigate whether the Hand Skills Test, constructed as an attempt to measure persistence beyond minimum standards on tiring tasks, was an equally valid predictor of school grades and job performance evaluations among higher and lower aptitude men. Three samples, consisting of from 122 to 135 enlisted radiomen, from 117 to 240 enlisted nuclear power men, and 108 officer candidates, were employed. GCT scores were used as the measure of aptitude for enlisted men and OQT scores for officers. Among radiomen and nuclear power men, the Hand Skills Test significantly predicted the school grades of low aptitude men with phi coefficients of .23 and .29 respectively. Among high aptitude radiomen and nuclear power men, test validities were not significantly different from zero. The Hand Skills Test significantly predicted job performance evaluations among low aptitude men in all three samples. Phi's ranged from .26 to .47. The findings suggested that as group aptitude level decreased, the validity of the Hand Skills Test increased. (Author)

AD-263 287 Div. 28
(TIPSB/LH) OTS price $6.60

Mount Sinai Hospital, New York.
A PRELIMINARY SURVEY OF THE INCIDENCE AND CAUSES OF EMOTIONAL DISTURBANCE AMONG ABSTRACT SCIENTISTS IN PRIVATE INDUSTRY,
by Milton R. Sapirstein. 1 Sep 61, 70p.
(Sponsored by the Office of Naval Research)
Unclassified report

DESCRIPTORS: *Scientific personnel, Personality, Attitudes, Emotions, Behavior, Psychoneurosis, Tests, Analysis, *Industrial psychology.

AD-263 337 Div. 28, 15
(TIPSB/MS) OTS price $2.60

Illinois U., Urbana.
THE INTERPRETATION OF MEASURES OF PROFILE (DIS-) SIMILARITY.
Separate technical rept. no. 3 on Some Properties of the D2-Statistic. Interpersonal Perception and Interpersonal Relationships in Therapeutic Counseling,
by Rolfe LaForge and J. McV. Hunt. 1 Aug 61, 27p. incl. tables, 27 refs.
(Contract Nonr-183411)
Unclassified report

DESCRIPTORS: *Psychometrics, *Perception, *Personality, Statistical analysis, Psychotherapy, Measurement.

Empirical and mathematical results were presented which strongly suggest that the generality observed for D2 is not a truly dyadic effect. Instead this generality appears to arise from consistencies in a rater's use of items apparent in his description of even a single Figure. One such consistency is the rater's tendency to use extremes in description. The cluster difference, d, and the q-correlation, R, were tentatively suggested as appropriate dyadic statistics for interpersonal perception research. Little advantage seemed to result from the use of a nonparametric measure of q-correlation, tau. The necessity of giving prior consideration to more easily interpretable monadic and linear combinations of item-ratings was stressed. Greater use of more conventional methods of multivariate statistical inference was urged. The complexity of the problem and the limitations of the above results, as well as some of the results themselves, guarantee that exceptions to any of the general rules proposed will be found in individual research situations. But this diversity clearly makes correct interpretation of such research dependent on greater exploration in depth than has been typical of multivariate interpersonal perception studies. (Author)

AD-263 592 Div. 28
(TIPSB/LH) OTS price $1.10

Georgetown U., Washington, D. C.
SOME INTERRELATIONSHIPS BETWEEN THE DEVELOPMENT OF THE PERSONALITY AND CHARACTER DISORDERS AND EGO AND SOCIAL IDENTIFICATION,
by John H. Rohrer. 16 Sep 61, 6p.
(Contract Nonr-153007)
Unclassified report

DESCRIPTORS: (*Personality, Diagnosis, Reaction (Psychology), *Adjustment (Psychology), Sociology, Attitudes, Behavior.)

This report presents a summary derived from the socialization practices that tend to produce

character and personality disordered behavior. While much of the evidence for the summary prepared is not given in this report it is derived from an intensive study of all members of ten families (46 people), each family having an adolescent boy who had a diagnosed character and personality disorder. (Author)

AD-263 734 Div. 28
(TIPSB/LH) OTS price $2.60

Human Engineering Lab., Aberdeen Proving Ground, Md.
PERFORMANCE OF A PURSUIT TRACKING TASK WITH DIFFERENT DELAY TIMES INSERTED BETWEEN THE CONTROL MECHANISM AND THE DISPLAY CURSOR,
by Harold C. Wallach. Aug 61, 25p. incl. illus. tables (Technical memo. no. 12-61)
Unclassified report

DESCRIPTORS: (*Tracking, Behavior, Reaction time, Effectiveness, Errors, Mathematical analysis, Test methods.)

The object of this investigation was to estimate the extent of deterioration of performance on a pursuit tracking task when various time delays were inserted between the control corrections and the corresponding display movements. Sixty subjects were used, arranged in 6 groups, with 10 subjects per group. Each group was assigned to a separate condition of delay time. Time delays of 0, 1, 3, 3.5, 4, and 5 seconds were employed. The results indicate that performance on this particular pursuit tracking task tended to deteriorate as the delay time was increased. It should be emphasized, though, that after as little as one half-hour of practice on the task, the performance of all of the subjects was at a level much superior to a chance level of control. However, the relationship between the amount of delay time and the degree of adequacy of control performance was not very clear-cut. The group variability of tracking scores was roughly proportional to the group mean values; that is, with higher delay, the group mean values of performance errors increased, but the group variability of performance errors also increased. (Author)

AD-263 739 Div. 28
(TIPSB/LH) OTS price $3.60

Harvard U. Medical School, Boston, Mass.
THE REINFORCEMENT OF DISAGREEMENT IN A SMALL GROUP,
by David Shapiro. Sep 61, 37p. incl. tables. (Technical rept. no. 2)
(Contract Nonr-186643, Proj. NR 170-518)
Unclassified report

DESCRIPTORS: *Group dynamics, Social communications, Behavior, Learning, Reaction (Psychology), Reasoning, Attitudes, Effectiveness, Theory, Analysis.

In a series of 20 experimental and control groups, the effects of success and failure were studied on the social behavior of three-person groups. A simple game in which people can interact freely in a face-to-face arrangement was used. The experimental conditions so created yield data permitting the analysis of sequential changes in interaction on a trial-by-trial basis. Disagreement in making a series of decisions was the specific behavior investigated. The present approach captures the entire functioning of a group which is given a problem that cannot be really solved by a single person. The first are problems with disjunctive requirements; the second are problems with conjunctive requirements. We have asked whether a given category of conjunctive group behavior defined by several kinds of interaction can be maintained and manipulated by reinforcement. Our aim is to describe a major source of influence on interaction not by the individual characteristics of group members but by their instrumental acts in combination. The stability of the given interaction in a group then takes on the quality of an implicit rule or norm of behavior. (Author)

AD-263 779 Div. 28
(TIPSB/LH) OTS price $3.60

California U., Berkeley.
STUDIES IN CONFORMITY AND YIELDING. X. THE INFLUENCE OF A DISTORTED NORM UPON JUDGMENTS OF CHILDREN AND ADULTS.
Suppl. A to Final rept.,
by Read D. Tuddenham. 1960, 34p. incl. illus. tables (Technical rept. no. 11; Suppl. A to AD-264 190)
(Contract Nonr-22214)
Unclassified report

DESCRIPTORS: (*Group dynamics, Behavior, Reasoning, Personality, *Reaction (Psychology).)

Groups of college students and of ten to twelve year old children of similar background were tested for disposition to yield to a distorted group norm which conflicted with the physically right-appearing answer in a series of visual discrimination problems. Under control conditions, the girls were somewhat less accurate than the other groups,--boys, college men and college women. Under experimental conditions, all groups showed significantly greater yielding score means and variabilities than did controls. Children yielded more than the adults, but the difference between age groups was less impressive than the sex difference. The causes of the observed sex difference are hypothesized to lie in the differential training given boys and girls in our society. (Author)

AD-263 841 Div. 28
(TIPSB/MS) OTS price $2.60

Group Effectiveness Research Lab., U. of Illinois, Urbana.
CHANGES IN SELF CONCEPTS IN RELATION TO PERCEPTION OF OTHERS.
by Dorothy M. Kipnis. Apr 61, 25p. incl. tables, 10 refs. (Technical rept. no. 11)
(Contracts DA 49-007-md-569 and DA 49-007-md-2060)
Unclassified report

DESCRIPTORS: (*Perception, *Personality, *Group dynamics, *Sociometrics, Theory, Behavior, Adjustment (Psychology).

The subjects of the study were 87 students living together in a university dormitory. Self-evaluations of their own personality traits were examined in relation to their perception of their best friends. The results of the study were as follows: Students perceived smaller differences between themselves and their best friends than between themselves and a least-like roommate. Students who perceived their best friends to be relatively unlike themselves changed their self-evaluations more in a six-week time interval than did students who perceived their best friends to be like themselves. Students changed their self-evaluations, during the six-week time interval, so that they perceived smaller differences between themselves and their best friends. This reduction in perceived difference was ac-

complished through a process such that at the end of the six weeks, subjects tended to evaluate themselves in the way that they had previously evaluated their best friends. Subjects who ascribed relatively good personality traits to their best friends, as compared with themselves, changed their self-evaluations so that they later ascribed more positive traits to themselves. Subjects who gave their best friends relatively poor descriptions changed their self-evaluations in a negative direction. (Author)

29. QUARTERMASTER EQUIPMENT AND SUPPLIES

AD-263 354 Div. 29
(TIPSB/LH) OTS price $2.60

4750th Test Squadron (Tactics and Application Engineering), Tyndall Air Force Base, Fla.
MC-3/4 PARTIAL PRESSURE SUIT.
Final rept.,
by E. D. Stuyvesant. 16 July 59, 23p.
(Proj. ADC/73AD/59-6)
Unclassified report

DESCRIPTORS: *Pressure suits, Flight clothing, Tests, Aviation personnel, Ejection, High altitude, Atmosphere, Survival, Aviation safety.

The MC-3/4 Partial Pressure Suit can be satisfactorily utilized, with certain limitations, in the ADC environment if the operational and support requirements, as set forth in this report, are met. A 30 day test of the MC-3/4 Suit was conducted by pilots of the 498th Fighter Interceptor Squadron during which they performed alert commitments and flew day and night tactical missions in the garment. In addition, a simulated Operational Readiness Inspection was conducted to afford the pilots, as well as the personal equipment specialists, an opportunity to derive maximum utilization of this suit. As an interim garment, the MC-3/4 Partial Pressure Suit has operational limitations insofar as ADC commitments are concerned. There are two paramount factors which are the primary cause of these limitations. One factor is that the suit reduces the physical and mental tolerances of the pilot while he is on an alert status. The other factor is that the MA-2 Helmet is conducive to the onset of vertigo in all conditions of flight. (Author)

AD-263 355 Div. 29, 14, 16
(TIPSB/LH) OTS price $1.60

Quartermaster Research and Engineering Command, Natick, Mass.
EFFECT OF CLOTHING COLOR ON SOLAR HEAT LOAD,
by J. R. Breckenridge and R. L. Pratt. June 61, 15p. incl. illus. tables (Technical rept. no. EP-155)
Unclassified report

DESCRIPTORS: *Clothing, *Colors, Heat tolerance, Sun, Reflection, Absorption, Desert tests, Physiology, Perspiration, Evaporation.

Solar heat loads on seated subjects, wearing hot-weather uniforms in various colors, were determined during a series of 30 three-hour experiments in the desert near Yuma, Arizona. Black and white uniforms were compared during one summer, green and khaki during the next. The conclusions were derived from sweat evaporation data in sun and shade, assuming that evaporative heat loss equaled the total heat load. The calculated solar heat loads were 145-kg-cal/hr and 92 kg-cal/hr for black and white uniforms, and 113 kg-cal/hr and 92 kg-cal/hr for green and khaki. In terms of the total heat load on the man, the differences with color represented increases of only 17% for black over white, and 7% for green over khaki. The white uniform had much less advantage than fabric reflectance measurements would indicate, possibly because multiple reflections in the vicinity of folds and creases increased the amount of radiation absorbed. (Author)

AD-263 356 Div. 29, 16
(TIPSB/LH) OTS price $1.60

Quartermaster Research and Engineering Command, Natick, Mass.
THE EFFECT OF INSULATING THE PALM AND BACK OF HANDS ON FINGER COOLING,
by Alexander Cohen. June 61, 19p. incl. illus. tables (Technical rept. no. EP-153)
Unclassified report

DESCRIPTORS: *Gloves, *Thermal insulation, Effectiveness, Design, Military personnel, Test methods, Human engineering.

The effect of added insulation of the dorsum (back) or palm of the hand, or both, on the rate of finger cooling was studied. Additional insulation on the dorsum was found to reduce the rate of finger cooling at -20 F but not at 0 F hand-cooling temperatures. Added palm insulation had no effect on finger cooling under either of these two cold-exposure conditions. Combined dorsum and palm insulation produced a reduction in the rate of finger cooling at -20 F; this was largely attributable to the dorsum insulation alone. Within the range of insulation values used, systematic increases in the amount of dorsum insulation were not found to cause significantly greater reductions in the rate of finger cooling. Supplementary findings of the study were that added dorsum insulation reduced the rate of cooling of the dorsum area but did not offset the heat loss from the palm. Conversely, additional palm insulation lessened the rate of cooling of the palm but did not alter the rate of dorsum cooling. Reductions in finger-cooling rate due to the presence of added dorsum insulation did not necessarily follow from reductions in the rate of dorsum cooling. (Author)

AD-263 399 Div. 29, 14
(TIPSB/MS) OTS price $2.75

Massachusetts Inst. of Tech., Cambridge.
RESEARCH ON MATERIALS FOR USE IN A FULL PRESSURE SUIT.
Rept. for 1 July 58-31 Dec 59 on Physiology of Flight,
by D. M. Mellen, S. Backer, and B. J. Park.
Dec 60, 118p. incl. illus. table.
(Contract AF 33(616)5974, Proj. 7164)
(WADD TR 60-311) Unclassified report

DESCRIPTORS: (*Pressure suits, Materials, Textiles, Fibers, Design, Test equipment, Tests, Physical properties.)

This report presents the results of analytical and experimental studies directed towards design of a textile structure capable of use in a full pressure suit. The properties of the fiber have been considered, but in a role secondary to that of the geometric mechanics of the structure. A pressurized testing device has been designed and

used in measuring the bending and torsional rigidity of numerous sample-fabric cylinders. (Author)

30. RESEARCH AND RESEARCH EQUIPMENT

AD-263 109 Div. 30, 8, 25
(TIPSP/GRW) OTS price $11.00

Remington Rand Univac Div., Sperry Rand Corp., St. Paul, Minn.
PROJECT LIGHTNING. VOLUME II.
Quarterly progress rept. no. 3, vol. 2 on Phase 3, 1 Dec 60-28 Feb 61.
28 Feb 61, 137p. incl. illus. tables (Rept. no. PX 1599-3, vol. 2)
(Contract NObsr-77521)
Unclassified report

DESCRIPTORS: (*Digital computers, Computer logic, *Magnetic tape, Films, Ferromagnetic materials.) (Data processing systems, Data storage systems, Memory devices.) (Magnetic tape, *Processing, Glass, Films, *Electrodeposition.)

Research to serve as the basis for the evolution of an ultrahigh-speed data-processing system is summarized. The effects of rate of deposition, glass cleaning techniques, and different types of glass substrates on the magnetic properties of vacuum-deposited Permalloy films were studied. Rates of deposition ranging from 15 A/sec to 200 A/sec were found to have no effect on H sub C and H sub K within the error of the experiment. The magnetoelastic strain coefficient decreased slightly with increasing rate in this range. Optimum methods of making electro-deposited permalloy films were investigated. Methods were developed to reduce the composition variation. Magnetic properties of the permalloy films made are relatively poor. Both the anisotropy field and the coercive field are relatively large, and magnetic properties exhibit a large range over an array. Other investigation concerned: apparatus and instrumentation, measurements, switching and resonance studies, mathematics and logic research, and the Lightning test machine. (Author)

AD-263 110 Div. 30, 8, 25
(TIPSP/WLH) OTS price $8.10

Remington Rand Univac Div., Sperry Rand Corp., St. Paul, Minn.
PROJECT LIGHTNING. VOLUME I.
Quarterly progress rept. no. 3, vol. 1 on Phase 3, 1 Dec 60-28 Feb 61.
28 Feb 61, 84p. incl. illus. tables (Rept. no. PX 1599-3, vol. 1)
(Contract NObsr-77521)
Unclassified report

DESCRIPTORS: (*Digital computers, Computer logic, *Magnetic tape, Films, Ferromagnetic materials.) (Data processing systems, Data storage systems, *Memory devices.) Design.

Contents:
Lightning test machine logic
  Logic design of the lightning test machine
  Logic progress
  Clock for June demonstration unit
Logic circuits
  Logic test device
  Saturating OR-inverter
  Logic driver circuit
  Current-steering investigations
  Single-inverter counter
Memory circuits
  Sense amplifiers
  LMT sense digit loop circuit
  June demonstration unit word driver
  High-speed memory single-bit system
Memory stack design
  Theoretical
  Magnetic film core investigations
  Overlay design
Packaging
  Interconnections
  Modules
  June demonstration unit

AD-263 117 Div. 30, 32
(TIPSB/MS) OTS price $4.60

Stanford Research Inst., Menlo Park, Calif.
GRAPHICAL DATA PROCESSING RESEARCH STUDY AND EXPERIMENTAL INVESTIGATION.
Quarterly progress rept. no. 5, 1 Apr-30 June 61, by A. E. Brain, G. E. Forsen, and C. P. Bourne.
July 61. 46p. incl. illus. tables, 22 refs.
(Contract DA 36-039-sc-78343)
Unclassified report

DESCRIPTORS: (*Data processing systems, *Data storage systems, *Identification systems, Coding, Documentation.) (*Military research, Digital computers, Aerial photographs, Video networks.)

Patterns which may be correctly classified by a binary decision unit of the type employed in the machine described in AD-257 307 are discussed. The number of conflicting patterns that may be treated is comparable with the number of adjustable weighted connections associated with the binary. An argument is advanced for using a high controlling threshold to ensure that only that portion of the machine containing the most highly correlated information becomes active. If the threshold level is regulated by the area of the retina occupied by the pattern, the fraction of the machine that is active is roughly independent of the pattern size. Two methods are described for increasing the safety margin in borderline discrimination. The experiment requiring discrimination over the whole retina between superimposed horizontal and vertical bars was extended to include the toroidally-connected retinal space. Convergence to perfect discrimination was examined for several values of threshold level; a high threshold was most effective in ensuring rapid convergence. (Author)

AD-263 154 Div. 30, 25
(TIPSP/JSM) OTS price $2.60

Bolt, Beranek, and Newman, Cambridge, Mass.
ON MEASURING TRANSDUCER CHARACTERISTICS IN A WATER TANK,
by P. W. Smith, Jr., and T. J. Schultz. 8 Sep 61, 119p. incl. illus. tables, 38 refs. (Rept. no. 876, Job no. 110723)
(Contract Nonr-346800, Proj. NR 385-424)
Unclassified report

DESCRIPTORS: (*Water tanks, *Transducers, Measurement, Sound transmission, Sonar.) Acoustics, Underwater sound.

The concepts and procedures of room acoustics are reviewed and adapted to underwater sound problems. These results are used in an attempt to answer engineering questions about the design of calibration tanks. Presently available procedures for predicting the far-field characteristics of a transducer from near-field measurements are described and critically reviewed. Studies are made of: (1) sound absorption by mechanically damped plates; (2) the equations for energy functions in a steady sound field; and (3) the capabilities and applications of intensity meters. An outline is given of areas requiring further study before substantial progress is possible. (Author)

AD-263 249 Div. 30, 12
(TIPSP/WH) OTS price $3.60

Lincoln Lab., Mass. Inst. of Tech. Lexington.
ANELEX PRINTOUT SYSTEM FOR REENTRY PHYSICS PROGRAM,
by E. J. Peters, 21 Aug 61, 33p. incl. illus. tables (Rept. no. 21G-0017)
(Contract AF 19(604)7400)
Unclassified report

DESCRIPTORS: (*Re-entry aerodynamics, Instrumentation, *Digital systems.) (*Digital computers, Data storage systems, Data transmission systems, *Re-entry vehicles, Printing.) (Coding, Digital computer, Electronic circuits.)

The Anelex real-time print-out equipment in use at the MIT Arbuckle Neck site for the re-entry physics projject is described. (Author)

AD-263 334 Div. 30
(TIPSB/LH) OTS price $4.60

Cowles Foundation for Research in Economics, Yale U., New Haven, Conn.
THE CONSTRUCTION OF A BUSINESS GAME FOR TEACHING AND RESEARCH PURPOSES. PART 3. THE COMPUTER PROGRAM AND ALLIED MATERIALS,
by Martin Shubik. 6 Sep 61, 42p. incl. illus. tables (Cowles Foundation Discussion Paper no. 115, pt. 3)
(Contract Nonr-305501, Proj. NR 047-006)
Unclassified report

DESCRIPTORS: *Digital computers, Games theory, *Teaching machines, Construction, *Research program administration, Programming, Information theory.

AD-263 346 Div. 30, 8
(TIPSE/DLW) OTS price $1.60

PRD Electronics, Inc., Brooklyn, N. Y.
8.5 R-F CONNECTOR TEST SET.
Interim engineering rept. no. 5, 1 July-631 Aug 61,
by L. A. Nadler. 31 Aug 61, 12p. incl. illus.
(Contract NObsr-81373)
Unclassified report

DESCRIPTORS: (*Waveguide couplers, Antenna couplers, Coaxial cables, Electric connectors, *Test sets.) (Standing wave ratios, Electromagnetic wave reflections, Automatic, Measurement, Broadband, Test equipment.) (Backward-wave oscillators, Signal generators, Sweep generators, Coupling circuits, Cathode ray tubes, Display systems, Design.) Electron tubes, Oscillators, Electronic circuits, Reflectometers.

Progress on the BWO signal source is described and an alternate solution to the ratiometer problem is discussed. The details of measurement of the etched slot Tchebycheff array are given and the details of the final bi-directional coupler are supplied. Detailed progress on the slab-line load, r-f connector terminations, and adapters is presented. (Author)

AD-263 353 Div. 30, 8, 1
(TIPSE/DSW) OTS price $5.60

4750th Test Squadron (Tactics and Application Engineering) Tyndall Air Force Base, Fla.
EVALUATION OF THE UG897 AUTOMATIC TEST SET,
by Alfred H. Uhalt. 20 Oct 59, 53p. incl. illus.
(Proj. ADC/73AD/59-12)
Unclassified report

DESCRIPTORS: (*Test sets, *Maintenance equipment, Automatic, Memory devices, Magnetic tape, Programming, Mobile, Reliability, Tests.) (*Jet fighters, Automatic pilots, *Control systems, Computers, Airborne, Electronic circuits, *Electrical networks, Test equipment.) Jet planes.

The UG897B-1 automatic test set is an automated, tape-programmed, mobile, flight line tester for the F-101B Automatic Flight Control System (AFCS) and Central Air Data Computer (CADC). It is capable of: (1) functional flight line checking of the F-101B AFCS and CADC, (2) rapid periodic inspection of the AFCS, (3) self-monitored operation, thus eliminating any need for periodic calibration, and (4) providing complete electronic checkout capability of the F-101B AFCS and CADC. The UG897B-1 proved both highly accurate and reliable to an extreme not often found in this type of equipment. During the evaluation, the test set accurately located all induced and actual flight malfunctions assigned to it. Use of the set reduced average flight line trouble-shoot time by an estimated 80% and, in many cases, eliminated a functional check flight. This represented a considerable savings in manpower, flight time and dollars. The tester has considerable growth potential toward checking other electrical systems and aircraft. (Author)

AD-263 405 Div. 30, 25
(TIPSE/JSM) OTS price $8.60

Weizmann Inst. (Israel).
DESIGN AND CONSTRUCTION OF APPARATUS FOR AUTOMATIC DETERMINATION OF OPTICAL DISPERSION.
Annual rept. for period ending 31 Mar 60,
by J. H. Jaffe. Jan 61, 63p.
(Contract AF 61(052)57)
(AFCRL-424) Unclassified report

DESCRIPTORS: (*Diffraction, *Gases, Determination, Automatic, Optics.) (Refractometers, *Refractive index, Light.) Optical instruments, *Spectrophotometers.

An optical dispersion curve is determined by a double instrument. A monochromator selects a wavelength and a refractometer determines the refractive index at this wavelength. A method is developed that carries out this procedure automatically. Its application to the specific case of the Rehovoth monochromator-refractometer is outlined. (Author)

AD-263 409 Div. 30, 13, 2
(TIPSP/MFA) OTS price $3.60

Air Force Missile Development Center, Holloman Air Force Base, N. Mex.
DESCRIPTION OF SPECIAL ENVIRONMENTAL FACILITY (STRATOSPHERE CHAMBER) FOR UPPER ATMOSPHERE RESEARCH AND COMBINED ENVIRONMENTAL TESTING.
Aug 61, 28p. incl. illus. tables (AFMDC TR 61-24)
Unclassified report

DESCRIPTORS: (*Test equipment, Instrumentation, Design, *Stratosphere.) (*Upper atmosphere, *Altitude chambers, *Controlled atmospheres, Temperature, Humidity, Vibration.) (Data, Data processing systems, Recording systems, Magnetic recording systems, Programming.) Personnel.

The Air Force Missile Development Center Stratosphere Chamber is an altitude-temperature-humidity-infrared-vibration simulation facility designed for advancement of missile and space systems. Unique features of the equipment are the ability to automatically control, program, and record environment conditions. Repeatability of test conditions is the objective of the facility. Accessory instrumentation for monitoring of specimens and automatic digital data logging are provided at the panel. Complete specifications and capabilities of the Stratosphere Chamber were compiled for use by project test engineers who propose to use the facilities of the Chamber to test their equipment. (Author)

AD-263 417 Div. 30, 22
(TIPSE/CRJ) OTS price $1.60

Block Associates, Inc., Cambridge, Mass.
DESIGN AND CONSTRUCTION OF A ROCKET-BORNE RADIOMETER FOR MEASUREMENT OF PLUME MODULATION,
by Chandler W. Jones, 31 Oct 60, 11p. incl. illus. (Scientific rept. no. 3)
(Contract AF 19(604)5738)
(ARCRL TN 60-682) Unclassified report

DESCRIPTORS: (*Radiometers, *Infrared equipment, Design, Airborne.) (*Sounding rockets, *Exhaust gases, *Infrared spectroscopy, Infrared radiation, Measurement.) Electronic circuits, Electron tubes, Transistors, Amplifiers.

An infrared radiometer is described which was designed and constructed to measure the audio modulation of the plume radiation of an Aerobee Hi sounding rocket. Radiation between 2.65 microns and 2.85 microns modulated at frequencies between 2 and 2,000 c was converted to an electrical signal by a lead selenide detector and an electronic amplifier. The signal was then telemetered to earth by the rocket telemetry system. Portions of the signal corresponding to specific altitudes were placed on magnetic tape and played through a frequency analyzer. Plots of signal amplitude versus frequency at given altitudes could then be made. The instrument, called Esmeraldy 7, was mounted in a tail fin of the rocket. To avoid changing the aerodynamic effect of the fin, the outer dimensions of the instrument were constrained to fit inside the fin, which tapered in 2 directions. (Author)

AD-263 434 Div. 30, 6
(TIPSE/DLW) OTS price $7.60

Naval Ordnance Lab., Corona, Calif.
BACKSCATTER MEASUREMENTS FROM TARGETS AT X-BAND FREQUENCY. PART 1: TEST EQUIPMENT, PROCEDURES, AND RESULTS,
by A. N. Hilkevitch and A. J. Henderson.
15 July 61, 73p. incl. illus. tables
(In cooperation with Data Sphere Co.)
(NAVWEPS rept. no. 7180, pt. 1)
Unclassified report

DESCRIPTORS: (*Radar targets, Aerial targets, Target drones, *Microwaves, X band, *Electromagnetic wave reflections, *Radar reflections, Scattering, Antenna radiation patterns, Measurement.) (*Radar echo areas, Radar scanning, *Radar reflections, *Jet fighters, Tails, Wings, Airframes, Tests.) (*Target drones, Radar signals, Polarization, Tests.) (*Test facilities, Radar equipment, Radar antennas, Frequency modulation, Test equipment, Test methods.) Guided missile fuzes, Data processing systems, Antennas, Jet planes, Fighters.

Microwave backscatter measurements were taken at X-band frequency on the nose cone, tail section, and wing of an F9F-2 fighter aircraft and on a complete Ryan KDA drone. The measurement system employed FM-CW autocorrelation techniques, with sinusoidal modulation and third-harmonic detection. The system sensitivity exceeded 110 db below a 1-mw reference level. Tests of accuracy showed that the return from the system agreed (within 1 db) with the calculated theoretical return. In addition, the measurement system was repeatable. Measurements were taken at a variety of antenna and target positions by both linear and variable-angle scanning techniques. The measurement technique is described, and data results, obtained by several data-reduction techniques, are presented. Cross-polarization data were taken on the Ryan KDA drone. New data-reduction methods and measurement procedures are suggested. (Author)

AD-263 538 Div. 30
(TIPSB/MS) OTS price $1.60

Ballistic Systems Div., Air Force Systems Command, Inglewood, Calif.
PERT. A PROGRAMMING AND CONTROL TECHNIQUE FOR SPACE AGE MANAGEMENT.
1961, 17p. incl. illus.
Unclassified report

DESCRIPTORS: (*Management engineering, *Programming, *Data processing systems, *Research program administration.) (Air Force, Air force operations, Operations research, Guided missiles.)

AD-263 540 Div. 30, 25, 6, 22
(TIPSP/WLH) OTS price $5.60

Ordnance Research Lab., Pennsylvania State U., University Park.
SCANNED LINE-HYDROPHONE METHOD OF ANGLE DETERMINATION.
Miss-Distance Indicator Progress rept.,
by D. C. Whitmarsh, M. T. Pigott, and J. L. Brown, Jr. 1 Sep 61, 53p. incl. illus. tables.
(Serial no. 80)
(Contract NOrd-16597)
Unclassified report

DESCRIPTORS: (Underwater ordnance, *Underwater ordnance detectors, Tracking.) (Sound transmission, *Underwater sound transmission, Acoustics, Angle of arrival, Hydrophones.)

The Miss-Distance Indicator project is an investigation into methods of tracking and plotting the trajectory of tame antisubmarine ordnance near a target submarine. A method for determining the angle of arrival of a sound wave is discussed in detail. A group of independent hydrophone elements, uniformly spaced along a straight line, is used to measure the angle of arrival. The motion of a single hydrophone moving relative to the sound waves is simulated

by sampling the outputs of these elements in succession. It was found that the scanned line-hydrophone system simulates, almost exactly, the single, moving hydrophone, and the frequency equation is found to hold. The frequencies of both pure-tone signals and narrow-band noise are shifted according to the above equation. Improvements in signal-to-noise ratio of over 14 db have been measured when the signal and the noise arrive from different directions. The angular resolution was found to be equal to the ratio of the wavelength of the sound to the component of the hydrophone length normal to the direction of sound propagation. This method appears to be quite satisfactory for angle determination and should be easily incorporated in a plotting system. (Author)

AD-263 551 Div. 30, 14
(TIPSM/BRW) OTS price $4.60

Aerospace Corp., El Segundo, Calif.
HIGH MACH NUMBER AND MATERIALS RESEARCH PROGRAM PHASE II. ARC PLASMA INVESTIGATIONS AND ARC TUNNEL MATERIALS STUDIES.
Semiannual technical rept., vol. 1., 1 Jan-30 June 61,
comp. by D. J. Spencer. 30 June 61, 33p. incl. illus. tables (Rept. no. TDR-594(1206-01)STR, vol. 1)
(Contract AF 04(647)594)
Unclassified report

DESCRIPTORS: (*Guided missile noses, Re-entry vehicles, Materials, Refractory materials.) (*Test facilities, Hypersonic wind tunnels, Electric arcs, Plasma jets, Test methods, Test equipment, Tests.) (*Refractory materials, Refractory coatings, Ceramic coatings, Plastic coatings, Metal coatings, Heat resistant polymers.) (*Flame spraying, Tungsten.) (Re-entry aerodynamics, Aerodynamic heating, Simulation, Ablation, Hypersonic flow, Gas flow, Turbulent flow, Heat transfer, Enthalpy, Measurement, Analog computers.)

Progress is reported for the High Mach Number and Materials Research Program, Phase II Arc Plasma Investigations, and Arc Tunnel Materials Studies. The enthalpy computer was fabricated and rendered operational. Studies were initiated on methods of insuring long duration constant power runs and on trajectory simulation. A program to build up the 2-megawatt arc facility, begun and halted at Space Technology Laboratories, Inc. was resumed. This facility is nearing completion. A plasma spray unit was refined, and a complete facility set up. The porosity of W coatings sprayed with this unit was found to be superior to commercially sprayed coatings. (Author)

AD-263 607 Div. 30
(TIPSB/LH) OTS price $1.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
DIVISION 5. INFORMATION PROCESSING.
Quarterly progress rept., 15 June-15 Sep 61.
15 Sep 61, 11p.
(Contract AF 19(604)7400)
(ESD TN 61-1019) Unclassified report

DESCRIPTORS: *Data processing systems, *Digital computers, *Computers, Memory devices, Circuits, Design, Magnetic materials, Analog-to-digital converters, Theory, Psychology, Laboratory equipment, Speech, Speech representation.

Work has proceeded on the design of a small stored-program computer for use as a portable laboratory tool or as a component of a larger system. The computer, to be known as the LINC, has 1024 12-bit words of ferrite core storage, parallel binary arithmetic, built-in analog-to-digital converters, two display scopes, and two magnetic tape transports of special design. Programs are entered by means of a typewriter keyboard and are held on magnetic tape for subsequent use. The tape transports are block-addressed, random-access units similar to those on the TX-2 computer but holding only 1024 256-word blocks on 3-inch diameter reels. Use of the LINC in laboratory work will be facilitated by various switches and knobs for operating control of experimental parameters and by provisions for miscellaneous control-signal sensing and generation. As a component of a larger system, the LINC will provide a basic memory, processor, magnetic tape, and monitoring and control apparatus in very flexible form. (Author)

AD-263 623 Div. 30, 25
(TIPSE/MS) OTS price $5.60

Stanford Research Inst., Menlo Park, Calif.
EVALUATION OF FLUX-SWITCHING MODELS FOR MAGNETIC DEVICES,
by V. W. Hesterman. Sep 61, 46p. incl. illus. tables, 21 refs. (Technical rept. no. 2)
(Contract Nonr-271200)
Unclassified report

DESCRIPTORS: (*Computers, *Magnetic core switches, Design.) (*Mathematical analysis, Differential equations, Functions, Theory.)

The study of new magnetic devices for computers creates a need for a practical flux-switching model. This paper presents most of the analytical flux-switching models which have been proposed in the past, together with some new ones, in a common terminology. These models are compared with each other and with experimental results which are included. For generality, the models are considered as descriptive of the magnetization M (Loop magnetization in amp/meter) as a function of the applied magnetic excitation H. The analytical models are evaluated by comparing experimental phi(t) (Time in seconds) curves from thick-walled cores with analytical curves obtained by integrating M(t) models over core dimensions for a number of different constant mmf values. The material (Telemeter T5) used for the experiments is a low-threshold, square-loop ferrite. Considerable care was taken to maintain good accuracy throughout the entire process of experimental verification. The paper contains discussions and conclusions on the relative merits of the various models considered. (Author)

AD-263 662 Div. 30, 2, 4, 12, 17, 20, 25
(TIPSB/MS) OTS price $3.60

Science and Tech. Section, Air Information Div., Washington, D. C.
SOVIET SCIENTIFIC OBJECTIVES AS REFLECTED IN PUBLISHED STATEMENTS.
Rept. no. 1, 1 July 60-30 June 61.
31 Aug 61, 29p. 40 refs. (AID rept. 61-111)
Unclassified report

DESCRIPTORS: *USSR, *Scientific research, Space flight, Spaceships, Satellites, Satellite vehicles, Aircraft, Electronics, Radiological physics, Plasma physics, Physics, Nuclear physics, Metallurgy, Astrophysics, Geophysics, Chemistry, Conferences.

Division 30 RESEARCH AND RESEARCH EQUIPMENT

This report contains 42 abstracts dealing with space vehicles and aircraft, electronics and radiophysics, theoretical physics and plasma effects, applied nuclear physics, technology of metals, astrophysics and geophysics, chemistry, and related sciences and information. The supplement to this report summarizes the discussions of the First All-Union Conference of Scientific Workers convened at the Kremlin on 12-16 June 1961. This supplement is included because it is believed this conference will significantly affect the general structure of Soviet science. (Author)

AD-263 721 Div. 30, 6
(TIPSE/DLW) OTS price $11.50

Bendix Radio Div., Bendix Corp., Baltimore, Md.
AN/ASM-13 PATTERN MEASUREMENTS OF THE IFF SIDE LOBE SUPPRESSION SYSTEM, EUFAULA, ALABAMA. Final rept.,
by. P. C. Georgallis. 9 Aug 61, 160p. incl. illus. tables,
(Contract AF 30(602)2346)
(RADC TR 61-220) Unclassified report

DESCRIPTORS: (*Antennas, *Antenna radiation patterns, *Identification systems, Lobing, Reduction, Mensurement.) (*Test sets, Test equipment, Recording devices, Airborne, Recording systems, Data processing systems, Test methods, Flight testing, Tests.)

The AN/ASM-13 was used to measure and record the composite field pattern structures of the IFF side lobe suppression system at the FPS-24 antenna site near Eufaula, Alabama. The ASM-13 antenna pattern analyzer was installed in a C-131 aircraft. The data taken were analyzed in such a manner as to determine the ability of the pertinent IFF side lobe suppression system to accomplish total suppression of all interrogations by antenna side lobes. The techniques employed to compile and analyze the data are described and the necessary tabular and graphic data presentations to determine the performance of the IFF side lobe suppression system involved are presented. (Author)

AD-263 726 Div. 30, 9
(TIPSP/GRW) OTS price $10.50

Guggenheim Aeronautical Lab., Calif. Inst. of Tech., Pasadena.
DEVELOPMENT AND CALIBRATION OF A COLD WIRE PROBE FOR USE IN SHOCK TUBES.
Rept. on Hypersonic Research Project,
by Walter H. Christiansen. 1 July 61, 125p. incl. illus. tables (Memo. no. 62)
(Contracts DA 04-495-ORD-1960, and DA 04-495-ORD-3231)
Unclassified report

DESCRIPTORS: (Anemometers, Design, Calibration.) (*Shock tubes, Instrumentation.) Subsonic flow, Transonic flow, Supersonic flow, *Superaerodynamics, *Shock waves, Gas flow, Heat transfer, Measurement, Wind tunnels.

The use of a fine unheated wire for making shock tube flow measurements is investigated. The operation of the instrument depends on the transient nature of the shock tube flow. It operates in a non-steady manner which is completely different from the usual hot wire operation. The rate of gain of heat to the wire is determined over a range of Mach numbers from 0.4 to 1.9 and a range of Reynolds numbers from 0.035 to 3,500. Measurements cover the continuum region, the slip and transitional regions, and extend into the free-molecule flow region. Dimensionless results are compared with hot wire measurements obtained in wind tunnels and are found to differ slightly, because the cold wire gains heat from the fluid while the hot wire loses heat to the fluid. Measurements are repeatable and self-consistent, and indicate that the wire can be used to give an accurate flow measurement in the shock tube. (Author)

AD-263 764 Div. 30, 9
(TIPSE/WAW) OTS price $.75

National Aeronautics and Space Administration, Washington, D. C.
DESCRIPTION OF A 2-FOOT HYPERSONIC FACILITY AT THE LANGLEY RESEARCH CENTER,
by George M. Stokes. Sep 61, 23p. incl. illus. tables (NASA Technical note no. D-939)
Unclassified report

Also available from NASA, Wash. 25, D. C., as NASA Technical note no. D-939.

DESCRIPTORS: (Wind tunnels, *Hypersonic wind tunnels, Supersonic wind tunnels, Design, Aerodynamics, Hypersonics, Supersonics, Boundary layer.) (Wind tunnel nozzles, Nozzles, Hypersonic nozzles, Diffusers, Air ejectors, Design.)

The mechanical and aerodynamic features of a two-foot hypersonic facility at the Langley Research Center are described. The facility provides for the testing of aerodynamic models in the Mach number range between 3 and 7 at approximate Reynolds numbers between 0.5 and 1.0 times 10 to the 6th power. The facility was designed to obtain the needed pressure ratio through the use of ejector nozzles. Compressors driving the ejectors operate continuously at a pressure ratio of 4 and thus give the facility a continuous running capability. Curves are presented to show the ranges of total temperature, total pressure, Reynolds number, dynamic pressure, and static pressure available in the tunnel. The flow in the test section is suitable for model tests at all Mach numbers between 3 and 7, although the nozzle blocks were contoured for a Mach number of 6. (Author)

AD-263 771 Div. 30, 25
(TIPSM/EET) OTS price $1.10

Naval Ordnance Test Station, China Lake, Calif.
MEASUREMENT OF THERMAL PROPERTIES AT HIGH TEMPERATURES,
by Warren K. Smith. Aug 61, 10p. incl. illus. tables (NOTS TP 2624)
Unclassified report

DESCRIPTORS: (*Radiant heating panels, High temperature research, Laboratory equipment, *Thermal conductivity, *Thermal diffusion, *Specific heat, Measurement, Sandwich construction, Aerodynamic heating, Simulation.) (Materials, Deterioration, Ablation, Test equipment.)

Radiant-heating equipment was adapted for the measurement of the properties of materials at high temperatures. With a single sandwich, thermal diffusivity can be measured as a function of temperature. With a double sandwich in which the outer layers are a material of known thermal properties, it is possible to measure thermal diffusivity, volume specific heat, and thermal conductivity of the inner layers versus temperature. The method is capable of at least engineering accuracy and is much more rapid than conventional methods. Examples of the data that can

be obtained are presented. The method is expected to be especially useful for sandwiches and composities as well as for the measurement of properties of materials in process of deterioration, such as for ablating nose cones. (Author)

AD-263 798 Div. 30, 25
(TIPSM/EET) OTS price $4.60

Brown U., Providence, R. I.
A VERSATILE BI-AXIAL TESTING MACHINE FOR INVESTIGATION OF PLASTICITY, CREEP OR RELAXATION OF MATERIALS UNDER VARIABLE LOADING PATHS.
Final rept. on Investigation of Relationship Between Time Sensitive Mechanical Properties of Plastics,
by W. N. Findley and A. Gjelsvik. Aug 61, 49p. incl. illus. (Rept. no. EMRL-19)
(Contract DA 19-020-501-ORD-4595, Proj. TB4-003D)
Unclassified report

DESCRIPTORS: (Mechanics, *Laboratory equipment, Test equipment, Mechanical properties, Tensile properties, Load distribution, Torque, Hydrostatic pressure, Plasticity, Creep, Determination, Plastic tubing, Pipes, Rods.)

A machine is described for tests of high sensitivity on tubular specimens subjected to combinations of tension, torsion and internal pressure at room or elevated temperature. Load capacity is 12,000 lb in tension, 3000 in.-lb. in torsion, and 1200 psi internal pressure. Deflections of one in. or more and 150 degrees rotation can be accommodated without cross interference between loading systems. A method of detecting and correcting for eccentric loads was incorporated. Either constant load or constant deflection tests may be performed and a proportional loading device permits applying the load at a constant ratio of tension to torsion followed by excursions from the final loading along another constant ratio of increments of tension and torsion. An electric furnace and controls permit temperatures up to 1950 F. However, the indicated strain measuring sensitivity will probably not be maintained at temperatures much above 600 F. (Author)

AD-263 836 Div. 30, 9, 1
(TIPSE/WAW) OTS price $3.60

Princeton U., N. J.
RESULTS OF EXPERIMENTAL CORRELATION OF MODEL AND FULL SCALE HELICOPTER AND VTOL LONGITUDINAL DYNAMICS,
by Howard C. Curtiss, Jr., and William F. Putman. Apr 61, 37p. incl. illus. table (Report no. 543)
(Contract DA 44-177-tc-524)
Unclassified report

DESCRIPTORS: (*Helicopters, *Vertical take-off planes, Tests, Model tests, Stability, Stability (Longitudinal), Aerodynamics, Measurement.) (*Test facilities, Effectiveness, Simulation.)

Results of experiments to evaluate the degree to which dynamically similar models tested in the Princeton University Forward Flight Facility simulate the dynamics of full scale aircraft are presented. Two models were utilized, a single rotor helicopter and a tilt-wing VTOL aircraft. Excellent agreement between the response of the models and the full scale aircraft was obtained. (Author)

AD-263 889 Div. 30
(TIPSE/DLW) OTS price $1.10

Diamond Ordnance Fuze Labs., Washington, D. C.
A METHOD OF DISPLAYING PULSE REPETITION FREQUENCY JITTER,
by Paul E. Taylor, Jr. 30 Aug 61, 10p. incl. illus. (Rept. no. TR-917)
(DOFL Proj. 26220)
Unclassified report

DESCRIPTORS: (*Display systems, *Oscilloscopes, *Pulse analyzers, Oscilloscope screens, *Pulse modulation, Pulse generators, Test sets, Test equipment, Design.) Photographic recording systems.

A method of plotting the instantaneous period of a pulse train on an oscilloscope was devised that provides a continuous record of pulse spacing at high repetition frequencies. The technique is useful in the study of the distribution of pulse spacing in pulse modulators in which purposeful jitter is introduced. The oscilloscope trace is triggered by alternate pulses of the pulse train to be analyzed, and the intervening pulses are used to intensify the trace at the time of their occurrence. The vertical position of the trace is varied linearly at a relatively slow rate in order to separate each intensified spot from the preceding spots. In the resulting display, time between pulses is measured on the horizontal trace, and progressing time along the pulse train is measured vertically. (Author)

AD-263 890 Div. 30, 22, 25
(TIPSP/JUP) OTS price $1.60

Diamond Ordnance Fuze Labs., Washington, D. C.
LIGHT-GAS GUN FOR PRODUCTION OF SHOCK PRESSURE IN SOLIDS,
by H. R. Kollmeyer. 15 Aug 61, 23p. incl. illus. (Rept. no. TR-933)
(DOFL Proj. 30300)
Unclassified report

DESCRIPTORS: (*Hypervelocity guns, Design.) (*Solids, Pressure, *Shock, Wave transmission.) (Hypervelocity projectiles, *Impact shock.) (Test equipment, Pressure gages.) (Gas cylinders, Helium, Containers.) Instrumentation.

A 4-in. air gas gun modified to use light gases is capable of accelerating 150-gm masses to 4000 fps as a routine operation. Photoelectric means are employed to measure the projectile velocity to + or - 1 percent. The first application provided normal impacts of flat-faced projectiles to produce a continuous range of shock pressures in solids. (Author)

AD-263 895 Div. 30, 8
(TIPSP/TL) OTS price $6.60

Coordinated Science Lab., U. of Illinois, Urbana.
A TRANSISTORIZED DIGITAL-TO-ANALOG CONVERTER,
by William Joseph Kopek. Sep 61, 61p. incl. illus. tables (Rept. no. R-130)
(Contract DA 36-039-sc-85122)
Unclassified report

DESCRIPTORS: (*Transistors, *Analog-to-digital converters.) (*Electrical networks, Potentiometers, Voltage, Automatic, Electromagnetic waves, Sound generators, Oscilloscopes, Switching circuits, Resistors, Electronic switches, Coupling networks, Attenuation.) Laboratory equipment.

Division 31-SHIPS AND MARINE EQUIPMENT
Division 32-MISCELLANEOUS ARTS AND SCIENCES

Contents:
Statement of the Problem
General Converter Considerations
  Voltage vs. Current Operation
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  Ladder or Weighted Resistor Arrangement
  Transistor Parameters
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Precision Ladder Network
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31. SHIPS AND MARINE EQUIPMENT

No Entries

32. MISCELLANEOUS ARTS AND SCIENCES

AD-263 126 Div. 32, 17
(TIPSM/BRW) OTS price $8.60

Center for Documentation and Communication Research, Western Reserve U., Cleveland, Ohio.
TEST PROGRAM FOR EVALUATING PROCEDURES FOR THE EXPLOITATION OF LITERATURE OF INTEREST TO METALLURGISTS. V. THE SEMANTIC CODE TODAY,
by John L. Melton. 1961, 17p. incl. illus. tables.
(Contract AF 49(638)357)
(AFOSR-1210) Unclassified report

DESCRIPTORS: (Scientific reports, Literature, Dictionaries, Instruction manuals, *Documentation, Metallurgy, *Data processing systems, Computers, Coding, Punched card methods, Automation, Information theory, Cybernetics.)

Contents:
The semantic code dictionary
Appearance of new terms in the semantic code dictionary
Incidence of new terms in the semantic code dictionary
The semantic code in the searching procedure
Conclusions

AD-263 220 Div. 32
(TIPSB/LH) OTS price $2.60

Stanford Research Inst., Menlo Park, Calif.
ECONOMIC ORDER QUANTITIES IN CASES OF PRICE BREAKS, ORDER COST BREAKS, OR LEADTIME BREAKS,
by R. H. Davis. Mar 61, 25p. incl. illus. (Technical memo. no. 8)
(Contract Nonr-231100)
Unclassified report

DESCRIPTORS: *Economics, Costs, Statistical distributions, Scheduling, Industry.

This memorandum describes practical, iterative procedures for determining economic order quantities when price, order cost, or leadtime breaks exist. The first section discusses the price break problem, describes the recommended computing procedure, and illustrates the use of the procedure by means of practical examples. The second section describes a procedure for handling breaks in order cost and leadtime, together with examples of the computations. (Author)

AD-263 357 Div. 32, 29
(TIPSB/CDW) OTS price $9.60

Quartermaster Research and Engineering Command, Natick, Mass.
ANTHROPOMETRY OF ARMY AVIATORS,
by Robert M. White. June 61, 112p. incl. illus. tables (Technical rept. no. EP-150)
Unclassified report

DESCRIPTORS: (*Anthropometry, *Aviation personnel, Analysis.) (*Flight clothing, Human engineering, Design, Measurement.)

Information on the body size of Army aviators is available for the first time in the form of anthropometric measurements. The series of 500 flyers, including both warrant and commissioned officers, represents a sampling of about 10 percent of the Army aviator population. The anthropometric data, consisting of some 40 body measurements, have been analyzed, and are presented in the form of a table of percentile distributions and 82 bivariate charts. These data may now be applied in problems of design, sizing and tariffing of flight clothing and specialized equipment for Army aviators, as well as in other areas of human engineering which require the use of body size information in aviator-equipment-aircraft systems. (Author)

AD-263 525 Div. 32, 16, 25, 3, 12
(TIPSB/MS) OTS price $2.60

Army Chemical Research and Development Labs., Army Chemical Center, Md.
LIBRARY DOCUMENT LIST NO. 538 (UNCLASSIFIED SECTION) ITEM NUMBERS 61,887 - 62,175 INCL.
25 Aug 61, 29p. 288 refs.
Unclassified report

DESCRIPTORS: (*Bibliography, Chemistry, Physics, Medicine, Biological warfare, Guided missiles, Space probes, Atomic energy, *Scientific reports, *Documentation.)

33. TRANSPORTATION

AD-263 548 Div. 33, 2, 29
(TIPSB/CDW) OTS price $12.50

Army Transportation Board, Fort Eustis, Va.
REPORT OF ENVIRONMENTAL OPERATION. LEAD DOG 1960.
Final rept.
1960, 188p. incl. illus. tables, 21 refs. (Rept. no. TCB-60-023-E0)

Unclassified report

DESCRIPTORS: (*Arctic regions, *Exploration, Geography, Geology, Meteorology, *Transportation, Air transportation.) (Snow roads, Ice, Ice fog, Hazards, Trafficability.) (Vehicles, Aircraft, Operation, Maintenance.) (Personnel, Clothing, Food, Military rations.) (Communication equipment, Electronic equipment.)

The assigned mission Project Lead Dog 60, was accomplished, and resulting conclusions are described. Descent routes from the icecap to Centrum Lake and Bronlunds Fjord exist and are negotiable by tracked, low-ground-pressure vehicles. The ability of a tractor-train to travel long distances over the icecap and then to support other military activities at the terminus was demonstrated for the first time. Icecap navigation and trail operations procedures have been refined to a point of extreme reliability. The use of helicopters greatly facilitates detailed investigations of areas inaccessible to other means of transportation. The current W System Crevasse Detector is not sufficiently reliable for icecap operations. A more reliable detector is necessary for surface operations in marginal zones. Future tractor-train icecap operations should make a greater use of wheeled trailers and transporters. Future exploratory operations of this nature should make maximum utilization of mutually supporting surface-aviation parties. A high speed prime mover should be developed to make maximum utilization of the wheeled equipment. At present, there are no vehicles in the supply system which can be effectively mated with the 10 Ton Off-Road Trailers. (Author)

NON-MILITARY AND OLDER MILITARY RESEARCH REPORTS

* Descriptors marked with an asterisk will be included in the cumulative indexes.

BIOLOGICAL SCIENCES

Anatomy and Physiology

PB 158 357 $1.60

Army Medical Research Lab., Fort Knox, Ky.
THE RELATION OF THE ELECTRICAL RESISTANCE OF BLOOD TO TEMPERATURE, by G. W. Molnar, J. C. Rosenbaum, Jr. and others. Rept. on Environmental Physiology. 23 Nov 57, 16p. 13 refs. Rept. no. 310; AD-149 022.

DESCRIPTORS: *Blood, Electrical properties, Temperature, Resistance, Biophysics, Exposure, Climatic factors, *Blood plasma, *Blood proteins.

The electrical resistance of salt and protein solutions, plasma, blood, and packed erythrocytes is inversely and indirectly related to temperature in the range of 0° to 90°C through the effect of temperature on the viscosity of water. The correlation was true above 60°C only after disintegration of the corpuscles. (Author)

PB 157 037 $5.60

Naval Radiological Defense Lab., San Francisco, Calif.
MILITARY ASPECTS OF UNDERWEIGHT AND OVERWEIGHT, by A. R. Behnke. 1 Dec 57, 54p. 40 refs. Research and development technical rept. USNRDL-TR-205.

DESCRIPTORS: *Military personnel, *Body weight, *Anthropometry, Metabolism, Body fats, Physiology, Anthropological data.

Body weight can be estimated from "envelope" (chiefly circumferential) anthropometric dimensions in a precise rectilinear manner, i.e., the squared value of the sum of the dimensions multiplied by stature and a constant is equal to body weight. Lean body weight (LBW) can be calculated from "skeletal" measurements, chiefly diameters, but with less accuracy, when the reference standards are total body water and density. There is a complementary relationship between anthropometric measurements in men and women, such that constants for the conversion of dimensions into weight equivalents, although they differ for single measurements of homologous parts as the circumference of the shoulders or buttocks, are nevertheless identical if grouped or paired in the proper manner. The anthropometric data examined lend further support to the concept of an organized body pattern (distorted in the healthy individual only by the accumulation of excess fat) such that constants applicable to populations can be derived from measurements on a comparatively few individuals. It has been possible to compile anthropometric data for both a reference military man and a woman. A particular contribution of this report is a weight reduction experiment on one individual (age 53) on whom the above outlined techniques were employed to follow changes in body size and gross body composition as affected by dietary restrictions.

PB 157 936 $5.60

St. Louis U. School of Medicine, Mo.
FINGER AND FOREARM CUTANEOUS BLOOD FLOWS DURING CHANGING AMBIENT TEMPERATURE, by Leo C. Senay, Jr., Margaret L. Christensen, and Alrick B. Hertzman. Rept. on Physiology of Flight, Contract AF 33(616)3357. Mar 60, 51p. 20 refs. WADD Technical rept. 60-15; AD-236 647.

DESCRIPTORS: *Blood circulation, Temperature, *Skin, Measurement, Physiology, Heat transfer, *Arms, Dilation, Blood vessels, Stress (Physiology), Exposure, Climatic factors, *Hands, Perspiration, Body temperature, *Fingers.

When nude subjects were exposed to a slowly rising ambient temperature, digital vasodilatation preceded that in the forearm skin in the summer but the two proceeded together in the spring. The forearm vasodilatation followed a consistent course in both seasonal groups. The curvilinear relation of local skin temperature to local skin blood flow in the forearm often showed an abrupt inflection, suggesting an additional influencing factor. A consistent relation to local sweating was not apparent: vasodilatation often increased even while local skin temperature had stabilized or fallen slightly. The forearm vascular responses were prevented by local cooling. During repeat cycles of the ambient temperature, complete dissociation of the cutaneous vascular responses in finger and forearm and of forearm vasodilatation and sweating often occurred. Local temperature seemed the most important control factor of the forearm skin circulation. (Author)

Biochemistry

BNL-649(T-208) $0.75

Brookhaven National Lab., Upton, N. Y.
INSIDE THE PROTEIN MOLECULE, by C. H. W. Hirs. Brookhaven lecture series no. 3. Jan 61, 32p.

TID-13025 $4.60

Minnesota U., St. Paul.
THE BIOCHEMISTRY OF A NEW SULFUR MUSTARD, S-(DICHLOROVINYL)-L-CYSTEINE AND ITS RELATION TO APLASTIC ANEMIA. Progress rept. no. 6 on Contract AT(11-1)-364. June 61, 41p.

ORO-450 $1.60

Texas A. and M. Research Foundation, College Station.
STUDIES OF CELL METABOLISM, by Frederick H. Kasten. Final rept. on Contract AT(40-1)-2432. July 61, 17p.

ORO-416 $1.60

Wake Forest Coll., Winston-Salem, N. C.
FORMATION OF TISSUE PHOSPHOLIPIDS AND TOXICITY OF P^{32} AS RELATED TO DIETARY FACTORS. June 61, 20p.

TID-13306 $1.60

Western Reserve U. School of Medicine, Cleveland, Ohio.
BIOLOGICAL ACTIVITY OF DEOXYRIBONUCLEIC ACIDS, by John Spizizen and Lester O. Krampitz. Progress rept. on Contract AT(11-1)-944. July 61, 17p.

Radiobiology

AECU-4358(Suppl. 1) $1.10

Brookhaven National Lab., Upton, N. Y.
BIBLIOGRAPHY ON THE EFFECT OF PROTON AND DEUTERON IRRADIATION ON BIOLOGICAL MATERIAL, by Marjorie Comstock. 2p.

BNL-5417 $1.60

Brookhaven National Lab., Upton, N. Y.
OBSERVATIONS ON NUCLEAR RNA LABELED WITH TRITIATED CYTIDINE IN HUMAN CANCER CELLS IN CULTURE (HELA), by L. E. Feinendegen and V. P. Bond. July 61, 13p.

BNL-5414 $3.60

Brookhaven National Lab., Upton, N. Y.
TRITIUM LABELED THYMIDINE (H^3TDR) ITS SOMATIC TOXICITY AND USE IN THE STUDY OF GROWTH RATES AND POTENTIALS IN NORMAL AND MALIGNANT TISSUE OF MAN AND ANIMALS, by Eugene P. Cronkite, Victor P. Bond and others. July 61, 40p.

UCLA-480 $1.60

California U., Los Angeles.
EFFECT OF IRRADIATION ON DEVELOPING PROTEIN-SYNTHESIZING SYSTEMS, by Ole A. Schjeide, Nancy Ragan, and Sue Simons. Rept. on Contract AT(04-1)-GEN-12. 26 June 61, 17p.

UCD-101 $2.50

California U., Davis, School of Veterinary Medicine.
THE EFFECTS OF X-RADIATION ON WORK CAPACITY AND LONGEVITY OF THE DOG. Annual progress rept. no. 10, June 61, on Contract AT(11-1)-GEN-10. July 61, 124p.

UCLA-481 $1.60

California U., Los Angeles
PREPARATION OF COLLOIDAL SUSPENSIONS OF HUMAN SERUM ALBUMIN I^{131} FOR ESTIMATING LIVER BLOOD FLOW AND RETICULOENDOTHELIAL SYSTEM FUNCTIONS IN MAN, by G. V. Taplin, M. L. Griswold, and E. K. Dore. Rept. on Contract AT(04-1)-GEN-12. 23 June 61, 20p.

HW-SA-2021 $1.10

Hanford Atomic Products Operation, Richland, Wash.
BIOLOGICAL CONSIDERATIONS OF RADIOACTIVE WASTES IN STREAMS, by R. F. Foster. Rept. on Contract AT(45-1)-1350. Nov 60, 7p.

HW-70411 $0.50

Hanford Atomic Products Operation, Richland, Wash.
EVALUATION OF RADIOLOGICAL CONDITIONS IN THE VICINITY OF HANFORD, JANUARY-MARCH, 1961, ed. by I. C. Nelson. Rept. on Contract AT(45-1)-1350. Aug 61, 21p.

TID-13002 $1.60

Indiana U., Bloomington.
THE INFLUENCE OF RADIATION IN ALTERING THE INCIDENCE OF MUTATIONS IN DROSOPHILA. Progress rept. on Contract AT(11-1)-195. June 61, 17p.

LAMS-2602 $0.50

Los Alamos Scientific Lab., U. of California, N. Mex.
HEALTH PROBLEMS ASSOCIATED WITH THE ACCELERATION OF TRITONS IN A 2.5 MEV VAN DE GRAAFF, by Morris J. Engelke. Rept. on Contract W-7405-eng-36. Sep 61, 15p.

TID-13124 $1.10

Michigan U. Coll., Ann Arbor.
BRAIN FUNCTION, BEHAVIOR, AND IRRADIATION, by J. Olds. Technical progress rept. 1 Nov 60-31 Oct 61 on Contract AT(11-1)-953. July 61, 3p. ORA-04289-1-P.

ORNL-3159 $1.25

Oak Ridge National Lab., Tenn.
APPLIED HEALTH PHYSICS. Annual rept. for 1960 on Contract W-7405-eng-26. 45p.

TID-3551(Rev. 1) $1.00

Office of Technical Information, Atomic Energy Commission, Washington, D. C.
RADIATION PROTECTION STANDARDS, comp. by William E. Bost. A literature search. June 61, 45p.

IDO-16655 $1.00

Phillips Petroleum Co., Idaho Falls.
A METHOD OF DETERMINING THE INTERMEDIATE ENERGY NEUTRON DOSE, by Dale E. Hankins. Rept. on Contract AT(10-1)-205. Mar 61, 45p.

UR-596 $1.60

Rochester U., N.Y.
CARDIOPULMONARY CHANGES IN THE DOG FOLLOWING EXPOSURE TO X-RAYS, by S. M. Michaelson, B. Shreiner, Jr. and others. Rept. on Contract W-7401-eng-49. 28 Aug 61, 16p.

SC-4609(RR) $0.50

Sandia Corp., Albuquerque, N. Mex.
ENVIRONMENTAL BETA-GAMMA RADIOACTIVITY IN AIR AT SANDIA LABORATORY SECOND QUARTER 1961, by R. E. Womelsduff and J. E. Baker. Research rept. July 61, 10p.

CHEMISTRY

ANL-6404 $0.50

Argonne National Lab., Ill.
THE COEFFICIENT OF VOLUME EXPANSION FOR WATER AND WATER VAPOR IN THE CRITICAL REGION, by E. S. Nowak and R. J. Grosh. Rept. on Contract W-31-109-eng-38. Aug 61, 17p.

NAA-SR-6498 $0.50

Atomics International, Canoga Park, Calif.
HIGH TEMPERATURE REACTIONS OF THORIUM AND THORIA AND THE VAPOR PRESSURE OF THORIA, by A. J. Darnell and W. A. McCollum. Rept. on Contract AT(11-1)-GEN-8. Sep 61, 18p.

SCR-417A $0.75

Sandia Corp., Albuquerque, N. Mex.
A LOW DENSITY POTTING COMPOUND, by A. J. Quant. June 61, 30p.

GA-2060 $0.50

General Atomic Div., General Dynamics Corp., San Diego, Calif.
APPARATUS AND PROCEDURE FOR MEASURING REACTION OF THORIUM-URANIUM CARBIDES IN MOIST AIR, by C. S. Luby. Rept. on Contract AT(04-3)-314. Mar 61, 11p.

GA-2068 $0.75

General Atomic Div., General Dynamics Corp., San Diego, Calif.
REACTION-RATE STUDIES OF THORIUM-URANIUM DICARBIDES IN MOIST AIR, by G. B. Engle. Rept. on Contract AT(04-3)-314. Apr 61, 29p.

GAT-389 $0.50

Goodyear Atomic Corp., Portsmouth, Ohio.
ACID LEACHING OF ALUMINA FOR URANIUM RECOVERY, by W. S. Fleshman and J. R. Davis. Rept. on Contract AT(33-2)-1. Aug 61, 18p.

LA-2556 $2.75

Los Alamos Scientific Lab., N. Mex.
THE EQUILIBRIUM COMPOSITION OF THE C/H SYSTEM AT ELEVATED TEMPERATURES, by Russell E. Duff and S. H. Bauer. Rept. on Contract W-7405-eng-36. Sep 61, 177p.

LAMS-2604 $0.50

Los Alamos Scientific Lab., U. of California, N. Mex.
HINDERED SETTLING RATES OF CONCENTRATED SUSPENSIONS OF URANIUM DIOXIDE IN SODIUM, by Alexander Sesonske. Rept. on Contract W-7405-eng-36. Sep 61, 15p.

NBL-170 $2.25

New Brunswick Lab., N. J.
SEMIANNUAL PROGRESS REPORT FOR THE PERIOD JULY-DECEMBER 1960. Aug 61, 113p.

ORNL-3057 $2.00

Oak Ridge National Lab., Tenn.
THE DEAMINATION AND REARRANGEMENT OF erythro-1-AMINO-1-PHENYL-2-o-TOLYL-2-PROPANOL, by M. M. Staum. Rept. on Contract W-7405-eng-26. 92p.

IDO-16706 $0.50

Phillips Petroleum Co., Idaho Falls.
RELATIONSHIP BETWEEN YIELDS OF DIMERS OF A POLYPHENYL AND ITS PARTIAL REACTION RATES, by W. M. Hutchinson, H. R. Anderson, Jr. and P. W. Solomon. Rept. on Contract AT(10-1)-1080. Aug 61, 18p.

Y-1357 $0.50

Union Carbide Nuclear Co., Oak Ridge, Tenn.
DETERMINATION OF URANIUM AND YTTRIUM IN BERYLLIUM OXIDE BY X-RAY FLUORESCENCE, by G. E. Walden. Rept. on Contract W-7405-eng-26. Aug 61, 17p.

Analytical Chemistry

HW-59749 $1.60

Hanford Atomic Products Operation, Richland, Wash.
THE ANALYSIS OF EXHAUST PRODUCTS IN THE CHLORINATION OF PLUTONIUM OXIDE WITH PHOSGENE, by L. F. Lust. Rept. on Contract W-31-109-eng-52. Mar 59, 15p.

HW-69764 $1.10

Hanford Atomic Products Operation, Richland, Wash.
DETERMINATION OF ELUTION RATE OF A ZEOLITE-ADSORBED RADIOISOTOPE IN A RIVER, by B. W. Mercer and J. F. Honstead. Rept. on Contract AT(45-1)-1350. May 61, 11p.

HW-69511 $1.10

Hanford Atomic Products Operation, Richland, Wash.
DETERMINATION OF RADIO STRONIUM BY ION EXCHANGE, by F. P. Roberts. Rept. on Contract AT(45-1)-1350. 12 June 61, 8p.

UCRL-9773 $1.50

Lawrence Radiation Lab., U. of California, Berkeley.
STUDY OF THE NEAR-ULTRAVIOLET SPECTRUM OF MAGNESIUM OXIDE, by Sandor Trajmar. July 61, 60p.

IDO-14557 $0.50

Phillips Petroleum Co., Idaho Falls.
REMOTE DISSOLUTION AND ANALYTICAL PROGRAM FOR IRRADIATED THORIUM, by G. A. Huff, I. L. Doggett and others. Rept. on Contract AT(10-1)-205. July 61, 13p.

IDO-14558 $0.50

Phillips Petroleum Co., Idaho Falls.
SPECTROGRAPHIC DETERMINATION OF IMPURITIES IN HAFNIUM, by B. E. Ginther and G. V. Wheeler. Rept. on Contract AT(10-1)-205. Aug 61, 11p.

PWAC-352 $1.00

Pratt and Whitney Aircraft Div., United Aircraft Corp., Middletown, Conn.
THE PURIFICATION AND GAS CHROMATOGRAPHIC ANALYSIS OF HELIUM. Rept. on Contract AT(11-1)-229. June 61, 44p.

UR-601 $0.50

Rochester U., N. Y.
EVALUATION OF FACTORS IN THE ELUTION OF HYDROCORTISONE FROM PAPER CHROMATOGRAMS, by Frank M. Ganis, Malcolm W. Hendrickson and others. Sep 61, 17p.

DP-614 $0.50

Savannah River Lab., Aiken, S. C.
CYANOGEN-FREE SPECTRA, by J. A. Wheat. Rept. on Contract AT(07-2)-1. Aug 61, 9p.

DP-610 $0.50

Savannah River Lab., Aiken, S. C.
DETERMINATION OF ENRICHED URANIUM IN PROCESS WASTE STREAMS, by M. O. Fulda. Rept. on Contract AT(07-2)-1. Aug 61, 9p.

NDA-2154-6 $1.00

United Nuclear Corp., White Plains, N. Y.
EXPERIMENTAL DETERMINATION OF CONTAMINANTS IN SODIUM, by H. Steinmetz and B. Minushkin. Rept. on Contract AT(30-1)-2303(XV). Aug 61, 32p.

Organic Chemistry

TID-13422 $1.60

SYNTHESIS OF ORGANOMETALLIC COMPOUNDS OF THE LANTHANIDE AND ACTINIDE SERIES. Quarterly rept. no. 2, on Contract AT(11-1)-999. Aug 61, 4p.

UCRL-9722 $2.25

Lawrence Radiation Lab., U. of California, Berkeley.
CHARGE-TRANSFER ASSOCIATION AND PARAMAGNETISM OF SOME ORGANIC SYSTEMS, by John W. Eastman. Rept. on Contract W-7405-eng-48. Aug 61, 100p.

PB 157 303 $2.60

Plastics Lab., Princeton U., N. J.
STERIC ORDER AND DIELECTRIC BEHAVIOR IN POLYMETHYL METHACRYLATES, by H. A. Pohl, R. Bacskai, and W. P. Purcell. Rept. on Contract DA 36-039-sc-78105. 1 Apr 60, 25p. 22 refs. Technical rept. 57A; AD-235 222.

DESCRIPTORS: *Acrylic resins, *Stereochemistry, Molecular structure, Polarization, *Polymerization, Crystallization, Dielectric properties, Infrared spectroscopy, X-ray diffraction analysis, Catalysis, *Polymers.

The effects of steric order along the chain of polymethylmethacrylate upon the molar polarization, the infrared absorption spectrum, and the X-ray diffraction were compared. Steric order was seen to affect all these parameters. The study of the structure of the various stereospecific form of polymethylmethacrylate indicates that there are 18 most probable conformations possible. By taking account of the effect of steric hindrance and the resultant moment of each conformation, the root mean square dipole moment per monomer was calculated for the several species.

ORO-420 $1.10

Tracerlab, Inc., Boston, Mass.
SYNTHESIS OF COMPOUNDS LABELED WITH ISOTOPIC CARBON. Quarterly rept. no. 2, 1 Oct-31 Dec 49, on Contract AT(40-1)-279. Feb 50, 9p.

ORO-425 $1.10

Tracerlab, Inc., Boston, Mass.
SYNTHESIS OF ISOTOPICALLY LABELED COMPOUNDS. Quarterly rept. no. 8, 1 Apr-30 June 51, on Contract AT(40-1)-279. 8p.

Physical Chemistry

NAA-SR-6466 $0.50

Atomics International, Canoga Park, Calif.
THE MAXIMUM SOLUBILITY OF WATER IN POLYPHENYLS, by H. Mandel. Rept. on Contract AT(11-1)-GEN-8. Sep 61, 16p.

NAA-SR-MEMO-6393 $1.60

Atomics International, Canoga Park, Calif.
OXIDATIVE DECANNING OF IRRADIATED UO_2, by J. E. Bodine and J. Guon. May 61, 16p.

TID-12855 $8.60

Delaware U., Newark.
SEPARATION OF GASES BY THERMAL DIFFUSION USING BOUNDARY LAYER SUCTION, by Norman T. Mills and Robert L. Pigford. Final rept. on Contract AT(30-1)-1736. June 61, 98p.

HW-70041 $1.60

Hanford Atomic Products Operation, Richland, Wash.
REMOVAL AND RECOVERY OF PLUTONIUM FROM 234-5 BUILDING SUMP WASTE WITH PHOSPHATE ROCK, by A. E. Reisenauer and L. L. Ames, Jr. Rept. on Contract AT(45-1)-1350. June 61, 15p.

NYO-7123 $4.60

Harvard U., Cambridge, Mass.
THE PREPARATION AND PROPERTIES OF THE $(C_5H_5)_2M$ COMPOUNDS OF MANGANESE AND RHENIUM: PART I. MANGANESE CYCLOPENTADIENIDE, by G. Wilkinson, J. M. Birmingham, and F. A. Cotton. Rept. on Contract AT(30-1)-1461. Mar 55, 44p.

UCRL-9821 $0.75

Lawrence Radiation Lab., U. of California, Berkeley.
KINETICS OF THE OXIDATION OF MAGNESIUM FLUORIDE, by Donald R. Messier. Rept. on Contract W-7405-eng-48. Aug 61, 31p.

NYO-9200 $1.25

Massachusetts Inst. of Tech., Cambridge.
THE ADAPTATION OF NEW RESEARCH TECHNIQUES TO MINERAL ENGINEERING PROBLEMS. Semi-annual progress rept. for the six-month period ending 30 Apr 61, on Contract AT(30-1)-956. Sep 61, 57p.

TID-13497 $4.60

Michigan U., Ann Arbor.
ELECTROCHEMICAL REDUCTION OF PURINE, ADENINE AND RELATED COMPOUNDS: POLAROGRAPHY AND MACROSCALE ELECTROLYSIS, by David L. Smith and Philip J. Elving. Rept. on Contract AT(11-1)-70. Aug 61, 41p.

PB 157 497 $8.10

Michigan U. Coll. of Literature, Science, and the Arts, Ann Arbor.
THE CONDUCTANCE OF SOME HIGH VALENCE TYPE ELECTROLYTES, by Calvin J. Hallada and Gordon Atkinson. Technical rept. no. 1 on Contract DA 20-018-ORD-22375. Feb 61, 85p. 47 refs. Rept. no. 03637-1-T; OOR rept. no. 2350:1; AD-252 207.

DESCRIPTORS: *Electrolytes, *Conductivity, Valence, Solutions, Salts, *Sulfuric acid, Phenyl radicals, Solvent action, Ions, Sulfonates, Preparation, Dielectrics, Water, Theory, *Physical chemistry, *Electrical conductance, Organic solvents.

The conductance theory of Onsager and Fuoss (J. Phys. Chem. 61: 668, 1957) was shown to be valid when m-benzenedisulfonates and 1, 3, 6-napthalenetrisulfonate salts were examined in water. Consistent values for the closest distance of approach of the ions were obtained, and the conductance data for the 2:2 sulfonates crossed the limiting low tangent as predicted by the theory. When manganese benzene-disulfonate was forced to associate by using mixed solvents, the association constants were obtained by use of the extended theory for associated electrolytes. The higher association of $MnSO_4$ in mixed solvents was studied; the results indicated the consistency of the extrapolation back to the dielectric constant of water for both 2:2 electrolytes.

PB 161 610 $1.25

National Bureau of Standards, Boulder, Colo.
A COMPILATION OF THE PHYSICAL EQUILIBRIA AND RELATED PROPERTIES OF THE HYDROGEN-HELIUM SYSTEM, by D. E. Drayer and T. M. Flynn. June 61, 58p. 271 refs. Technical note no. 109.

DESCRIPTORS: *Hydrogen, *Helium, Vapors, Liquids, Chemical equilibrium, Thermodynamics, Transport properties, Vapor pressure, Density, Adsorption, Heat transfer, Handling, Purification, Equation of state, *Bibliography.

Published data have been used to calculate K-factors for the helium-hydrogen system over the range of 17.4° to 21.8°K and 2 to 32 atmospheres pressure. K-factors are presented graphically for three isotherms over this range. A bibliography of approximately 290 references is also presented on related properties for this system and for the pure components. (Author)

Y-1346 $0.50

Union Carbide Nuclear Co., Oak Ridge, Tenn.
RECOVERY OF NEPTUNIUM-237 BY ION EXCHANGE, by E. G. Laggis and C. R. Schmitt. Rept. on Contract W-7405-eng-26. July 61, 26p.

ORO-468 $1.10

United Nuclear Corp., Hematite, Mo.
THE CHARACTERIZATION OF UO_2 POWDERS. Monthly progress rept. no. 8, May-June 61, on Contract AT(40-1)-2699. 19 July 61, 8p.

TID-13284 $2.60

Wisconsin U., Madison.
RADIOLYTIC AND PHOTOCHEMICAL DECOMPOSITION AND EXCHANGE IN LIQUID AND GASEOUS CCl_3Br^1, by Austin H. Young and John E. Willard. 21p.

EARTH SCIENCES

Climatology and Meteorology

AD-258 640 $5.60

Army Electronic Proving Ground, Fort Huachuca, Ariz.
SIGNAL CORPS OPERATIONAL METEOROLOGICAL SUPPORT TO U. S. ARMY RESEARCH AND DEVELOPMENT ACTIVITIES DURING FISCAL YEAR 60. Dec 60, 54p. Rept. no. AEPG-SIG 970-32.

This report released by the cogizant military agency for sale to the public 13 Oct 61.

DESCRIPTORS: Military research, *Meteorology, *Military requirements, Weather stations, Operation, Analysis, Research program administration.

PB 156 904 $2.60

Army Signal Missile Support Agency, White Sands Missile Range, N. Mex.
AUTOMATIC METEOROLOGICAL DATA ACQUISITION SYSTEM, by Marjorie McLardie Hoidale. Feb 61, 29p. 1 ref. Special rept. 48; AD-252 379.

DESCRIPTORS: *Meteorological instruments, *Meteorological data, Digital computers, Guided missiles, Terminal ballistics, Landing impact, Refractive index, *Data processing systems, Microwaves, Infrared radiation.

A data acquisition system is described which is capable of simultaneous sampling of 64 meteorological instruments mounted on a 225-ft steel tower. Efficiency and flexibility are increased by use of digital computers, and further improved by recording the original information in a format containing computer programming data. The digital system and sensors, designed to sense and log automatically various meteorological parameters with accuracy and precision normally found only in laborator[illegible] are described. (Author)

PB 155 667 $3.60

Army Signal Missile Support Agency, White Sands Missile Range, N. Mex.
METEOROLOGICAL ROCKET WIND SENSORS, by Norman J. Beyers and Otto W. Thiele. Aug 60, 38p. 9 refs. Special rept. 41; AD-242 764.

DESCRIPTORS: *Sounding rockets, *Wind, Determination, Parachutes, Radar analysis, *Radar tracking, Radar reflectors.

Passive rocket-borne wind sensors, consisting of radar chaff and metallized parachutes, were utilized to determine wind flow in the altitude range from 50,000 to 270,000 ft. The motion of the sensors and their radar reflectivity as they descend were examined with radar and radiosonde equipment. Fall rates, parachute oscillations, chaff dispersion, parachute wind response lag time, and signal strength versus slant range were measured with the results utilized to determine limitations of the wind-sensing systems. Results indicate that Arcas parachutes with 3- to 5-pound payloads and the 8-foot Loki parachute with a 1-pound weight are applicable to about 160,000 ft while chaff sensors are suitable from about 140,000 to more than 230,000 ft. The parachutes and chaff discussed in this report provide adequate targets for SCR-584 and FPS-16 tracking radar over the altitude range for which Arcas and Loki rockets are used. (Author)

PB 155 669 $1.60

Army Signal Missile Support Agency, White Sands Missile Range, N. Mex.
AN OPERATIONAL EVALUATION OF THE DOUBLE-THEODOLITE WIND-VELOCITY COMPUTER, by Hubert H. Monahan. Oct 60, 16p. 3 refs. Special rept. no. 43; AD-243 766.

DESCRIPTORS: *Wind, *Velocity, Determination, *Theodolites, Test methods, Computers, Balloons, *Exterior ballistics.

The Double-Theodolite Wind-Velocity Computer technique for obtaining low-altitude wind velocity information is evaluated from an operational viewpoint. Basically, the computer system consists of the computer console, two electrically instrumented theodolites, and interconnecting cables. The modified theodolites transmit continuous angular information to the computer, where the data is processed to obtain a velocity-vs-height relationship. (Author)

PB 155 666 $2.60

Army Signal Missile Support Agency, White Sands Missile Range, N. Mex.
REVISED BALLISTIC STANDARD ATMOSPHERE FROM WHITE SANDS MISSILE RANGE, 1957-1959, by Louis D. Duncan. Aug 60, 27p. 3 refs. Technical memo. 751; AD-242 765.

DESCRIPTORS: *Meteorological data, Rocket trajectories; *Exterior ballistics, Wind, Temperature, Pressure, Atmosphere, Sound, Velocity, Acceleration.

The standard atmosphere formerly used at White Sands Missile Range, New Mexico was revised by using more recent meteorological data. A yearly standard and standards for each month are developed in equation form. The equations are given for pressure-height and speed of sound curves, as well as the methods by which these equations were derived. (Author)

PB 157 355 $2.60

Johns Hopkins U., Baltimore, Md.
TORNADOES AND DUST WHIRLS, by Robert R. Long. Technical rept. no. 10 on Contract Nonr-248(31) and Technical rept. no. 13 on Contract CWB-9919. Sep 60, 29p. 12 refs. AD-244 834.

DESCRIPTORS: *Tornadoes, Dust storms, Vortices, Turbulence, *Air mass analysis, Model basins, Tests.

A theoretical and experimental study of a vortex in a viscous fluid is applied to small-scale atmospheric vortices. The results suggest that a mother cloud or small-scale cyclone must be present to supply the great circulation of a typical tornado. Conversely, if a strong mother cloud is available, tornadoes seem likely when other atmospheric conditions are typical of a warm, spring or summer air mass.

AD-258 972 $10.00

Round Hill Field Station, Mass. Inst. of Tech., South Dartmouth.
STUDIES OF THE SPECTRA OF THE VERTICAL FLUXES OF MOMENTUM, HEAT, AND MOISTURE IN THE ATMOSPHERIC BOUNDARY LAYER, by Harrison E. Cramer, Frank A. Record and others. Annual rept. 15 Dec 59-15 Dec 60, on Contract DA 36-039-sc-80209. Feb 61, 130p.

This report released by the cogizant military agency for sale to the public 13 Oct 61.

DESCRIPTORS: *Atmosphere, *Micrometeorology, Turbulence, Heat, Water vapor, Transducers, Anemometers, Thermistors, Hygrometers, Analog to digital converters, Instrumentation, Digital computers, Wind, Temperature, Boundary layer, Spectrographic data.

Investigation of the spectra of the vertical fluxes of momentum, heat and water vapor in the atmospheric boundary layer under various thermal stratifications and surface roughnesses was conducted. Four major phases of completed work are outlined; (1) design of instrumentation (2) data-handling techniques (3) data-analysis procedures and (4) brief summary of initial field observations. (Author)

PB 157 332 $13.50

Washington U., Seattle.
PHYSICAL AND CHEMICAL DATA FOR A PORTION OF THE NORTHEAST PACIFIC OCEAN EXTENDING FROM THE COASTS OF WASHINGTON AND BRITISH COLUMBIA WESTWARD TO 131° W, APRIL 1956 - APRIL 1958, by C. M. Love. Technical rept. no. 66 on Contracts Nonr-477(01) and Nonr-477(10). Oct 60, 198p. 16 refs. Reference 60-18; AD-251 934.

DESCRIPTORS: Juan de Fuca Strait, Tables, *Oceanography, Washington, British Columbia.

Short offshore cruises were made to observe conditions off the coasts of Washington and Vancouver Island at various seasons of the year. Most of the cruises included a series of inshore stations which provided continuity of sampling from Puget Sound through Admiralty Inlet and the Strait of Juan de Fuca and out across the continental shelf to deep water offshore. A cruise was undertaken to investigate Cobb Seamount and environs, 280 miles west of Willpa Bay. Two oceanographic stations were taken, both located 50 miles west of Cape Flattery, for the purpose of thermistor bridge measurements. Data obtained during the cruises are presented.

Geology

UCRL-13015 $5.60

Colorado School of Mines Research Foundation, Inc., Golden.
SOURCES OF INFORMATION ON ROCK PHYSICS, by Lorraine Burgin. Technical rept. July 61, 55p.

TID-13669 $4.60

Rice U., Houston, Texas.
GEOLOGIC ASPECTS OF THORIUM RECOVERY FROM COMMON ROCKS. Quarterly progress rept. 1 June-31 Aug 61, on Subcontract 1491. 6p.

Oceanography

PB 157 404 $6.60

Texas A. and M. Research Foundation, College Station.
THE WATERS OF THE GULF OF MEXICO AS OBSERVED IN 1958 AND 1959, by Hugh J. McLellan. Technical rept. on Contract N7onr-48702. Sep 60, 62p. 3 refs. Reference 60-14T; AD-244 636.

DESCRIPTORS: Hydrographic surveying *Oceanographical data, Oceans, Collecting methods, Tables, Gulf of Mexico, Salinity, Temperature, Depth indicators.

The observations were gathered from three cruises of the R. V. Hidalgo in the form of serial observations at stations in the Gulf, the Caribbean, and the Atlantic Ocean between the U. S. Coast and Bermuda.

PB 157 403 $15.00

Washington U., Seattle.
THE DISTRIBUTION OF ANIMALS IN THE EASTERN NORTH PACIFIC AND ITS RELATIONSHIP TO PHYSICAL AND CHEMICAL CONDITIONS, by William Aron. Technical rept. no. 63 on Contract Nonr-477(10) and National Science Foundation Grant G-6168. Oct 60, 228p. 41 refs. Reference 60-55; AD-246 616.

DESCRIPTORS: *Aquatic animals, *Pacific Ocean, Oceanographical data, Oceanography, Salinity, Temperature, Oxygen, Phosphates, Animals, Chemical properties, Physical properties, Marine biology, *Fishes.

During the summer of 1957 and the summer and fall of 1958, the Department of Oceanography of the University of Washington conducted three cruises in the North Pacific aboard the research vessel Brown Bear. On all three cruises the standard measurements of salinity, temperature, oxygen, and phosphates were made; bathythermograms were taken regularly along the cruise track; in addition, nearly 600 hauls were taken using modified versions of the Isaacs-Kidd midwater trawl. Some of the data obtained from the trawl hauls are analyzed in this report, with particular emphasis on the relationship which exists between the physical and chemical conditions and the resident biological populations. (Author)

ENGINEERING

ANL-6377 $0.50

Argonne National Lab., Ill.
PROCESS VESSEL DESIGN FOR FROZEN-WALL CONTAINMENT OF FUSED SALT, by R. W. Kessie, J. D. Gabor and others. Rept. on Contract W-31-109-eng-38. Aug 61, 25p.

ORNL-3086 $1.50

Oak Ridge National Lab., Tenn.
CALCULATED TRANSIENT PRESSURES DUE TO IMPULSE AND RAMP PERTURBATIONS TO VENTILATING SYSTEMS IN BUILDINGS 3019, 3026, 3508, AND 4507, by J. J. Perona, W. E. Dunn, and H. F. Johnson. Rept. on Contract W-7405-eng-26. 62p.

SCTM-131-61(25) $1.25

Sandia Corp., Albuquerque, N. Mex.
DUST MONITORING IN CLEAN ROOMS, by R. C. Marsh and W. J. Whitfield. Aug 61, 49p.

DP-611 $0.50

Savannah River Lab., Aiken, S. C.
LEAKAGE OF WATER FROM GASKETED JOINTS PROPOSED FOR THE HWCTR-PART II AND PUMP MECHANICAL SEAL VAPOR LEAKAGE, by F. C. Apple. Rept. on Contract AT(07-2)-1. Aug 61, 26p.

TID-13110 $7.60

Tennessee U., Engineering Experiment Station, Knoxville.
AN EXPERIMENTAL INVESTIGATION OF THE STRESSES AND DEFLECTIONS OF A PERFORATED PLATE IN BENDING PART I, by C. C. Wilson and R. L. Maxwell. Rept. on Subcontract 875. June 61, 67p.

K-1131(Del.) $3.60

Union Carbide Nuclear Co., Oak Ridge, Tenn.
STRESS ANALYSIS AND CYCLE LIFE TEST OF A 72-INCH DIAMETER ALUMINUM EXPANSION JOINT, by L. C. Hare and H. H. Hall. Rept. on Contract W-7405-eng-26. May 54, 32p.

Aeronautical Engineering

AD-260 093 repriced $3.50

Bell Aerosystems Co., Buffalo, N. Y.
A STUDY OF VISUAL SIMULATION TECHNIQUES FOR ASTRONAUTICAL FLIGHT TRAINING, by T. F. Buddenhagen and M. P. Wolpin. Rept. on Training Equipment, Simulators and Techniques for Air Force Systems, Contract AF 33(616)7028. Mar 61, 210p. 122 refs. WADD TR-60-756.

DESCRIPTORS: *Flight simulators, Training, Training devices, *Space flight, Manned, Design, *Display systems, Television, Cameras, *Television display systems, Simulation.

A study was made of the engineering requirements for visual simulation in astronautical flight training and of the basic techniques available to accomplish such simulation. An evaluation of the potentialities of the various techniques led to the choice of closed circuit television as an image transfer technique. A preliminary design concept using this technique was formulated to determine the areas in which development work will be required prior to the design of a complete simulator. This report includes a compilation of applicable techniques, a determination of the probable visual environment of space, and an investigation of a method to predict the perceptual fidelity achieved by various simulation techniques as an aid in optimizing the training value of a simulator. (Author)

AD-261 262 $3.60

National Research Labs., Ottawa (Canada).
A STUDY OF EXTERNAL INSULATION REQUIREMENTS FOR THE EXTENSION OF ALUMINUM ALLOY STRUCTURES TO HOT SUPERSONIC AIRCRAFT, by W. Wiebe. May 61, 34p. 17 refs. Aeronautical rept. LR-306; NRC no. 6365.

DESCRIPTORS: *Thermal insulation, Insulating materials, Thermal conductivity, *Aluminum alloys, Airframes, Supersonic planes, Liquid cooled, Water, Titanium alloys, Ceramic materials, Laminates, Asbestos fiber, Phenolic resins, Silicone resins, Ceramic coatings, Materials, Heat transfer, Graphite, Ceramic fibers, Refractory materials, Physical properties, Porous materials, Mica, Thermodynamics, Concrete.

An analysis, based on the ability of an externally insulated aluminum alloy structure to equal the performance of a similar uninsulated titanium structure on the basis of panel stability, has been made in order to establish the required characteristics of the external insulation material for Mach 3.5 flight conditions. The results of the analysis show that in terms of the combination of strength, density and thermal conductivity, the requirements are stringent when assessed in the light of existing materials and flight durations of several hours. It is concluded that attractive benefits may be realized in the development of an appropriately tailored composite material. Appended to the report is a survey of refractory material properties, and the mechanism of heat transfer through porous insulation materials has been briefly reviewed. (Author)

AD-260 038 $1.60

Ohio State U. Research Foundation, Columbus.
AN ANALYSIS OF THE PURPOSES OF AIR-TRAFFIC CONTROL MESSAGES, by Henry M. Moser, Wallace C. Fotheringham, and Guillermo A. Gonzalez. Technical rept. 62 on Contract AF 19(604)6179. May 61, 17p. 3 refs. RF Proj. 1080; AFESD TN-61-40.

DESCRIPTORS: *Air traffic control systems, Human engineering, *Speech, Speech transmission, Voice communication systems, Vocabulary, Air control centers, Analysis, *Air traffic controllers, *Pilots, Communication systems, Radiotelephones.

The dominant message purposes of air-traffic controllers involve regulation, control, instruction, and advice; pilot messages emphasize acknowledgment, confirmation, request, and provision of nondirective information.

PB 158 360 $9.10

Space Technology Labs., Inc., Los Angeles, Calif.
HIGH MACH NUMBER AND MATERIALS RESEARCH PROGRAM. VOLUME II. ARC PLASMA INVESTIGATIONS AND ARC TUNNEL MATERIALS STUDIES PROGRAM, by D. J. Spencer, S. Lafazan and others. Semiannual rept. 1 Jan-30 June 60, onContract AF 04(647)309. [1960] 102p. 21 refs. STL/TR-60-V002-09205; AFBMD-TR-60-118; AFBMD Document no. 60-6616.

DESCRIPTORS: *Mach number, Ablation, Refractory coatings, *Plasma physics, *Re-entry aerodynamics, Ethylenes, Fluorides, Polymers, *Synthetic fibers, Nylon, Laminated glass, Glass textiles, Graphite, Tungsten, Plastics, Rocket motor nozzles, *Hypervelocity vehicles, Test facilities, Design, Turbulent flow, *Flame spraying, Enthalpy, Computers, *Electric arcs, *Plasma jets.

The 200-kilowatt arc tunnel was employed in material tests. Re-entry materials that were tested included Teflon, graphite-cloth-phenolic, graphite-refrasil-cloth, and phenolic nylon. A tungsten epoxy-fiberglas-laminate interface study was made employing the 200-kilowatt arc. Facility improvements include a tunnel calibration apparatus, design of a gas enthalpy computer, and addition of a second 200-kilowatt arc. Detail design of the high-power facility (2-megawatt) was completed. The 7 watt spray unit for preparation of material test specimens was completed. In initial tests, tungsten refractory coatings were sprayed successfully. (Author)

PB 158 359 $6.60

Space Technology Labs., Inc., Los Angeles, Calif.
SPACE PHYSICS INSTRUMENTATION. Semiannual rept. 1 Jan-30 June 60, on Contract AF 04(647)309. [1960] STL/TR-60-0000-09191; AFBMD-TR-60-104; AFBMD Document no. 60-5542; AD-242 422.

DESCRIPTORS: *Space flight, *Instrumentation, Beta ray spectrometers, Magnetometers, Ultraviolet detectors; Cerenkov radiation, Ionization chambers, Television display systems, Design, *Nuclear physics, Interstellar matter, *Astrophysics.

Electron detection experiments with solid state detectors indicated that by using such detectors as alternates for scintillation detectors in the high energy beta-ray spectrometer, significant savings were effected in space, weight, and power requirements. Fabrication was completed on the laboratory model of a luminescent chamber system for use as a high energy particle research tool. The luminescent chamber development program includes a feasibility demonstration of the use of the system in space flight. A monoenergetic electron source is being constructed for use in calibration and design evaluation of the high energy beta-ray spectrometer. An ultra high vacuum dry dock was constructed for use in investigations of current control and monitoring in the low emission gun of the electron accelerator. Design and development of the digital flux-gate magnetometer is complete except for those requirements made necessary by specific applications. Development of the search coil magnetometer carrier amplifier continued with the fabrication of a precision rectifier, a transistorized chopper-modulator, and a precision attenuation test unit. Construction of test jigs, the breadboarding of high impedance circuitry, and prototype electric field sensors for a proposed electric field meter were completed. The prototype electric field meter system is nearly ready for final checkout. (Author)

PB 157 947 $14.00

United States Testing Co., Inc., Hoboken, N. J.
DEVELOPMENT OF COMBINED ENVIRONMENT QUALIFICATION TEST PROGRAMS FOR AIR FORCE EQUIPMENT, by Peter H. Monsarrat. Rept. on Contract AF 33(616)6315. July 60, 201p. 48 refs. WADD Technical rept. 60-440; AD-254 756.

DESCRIPTORS: *Aircraft equipment, Tests, *Electronic equipment, Test equipment, Theory, *Electrical equipment, Classification, Identification, Stresses, Failure (Mechanics), Exposure.

The program consists of (1) a literature search; (2) an evaluation and analysis of standard single environment test procedures; (3) the development, for each Air Force equipment class, of a test program consisting of test procedures which simulate combinations of those environments applicable to the equipment class; and (4) test trials to determine the effect of the combined environment tests as compared to the effect of the single environment tests applicable to the equipment classifications. The theoretically developed combined environment test procedures are discussed in the light of the empirically determined findings and recommendations are made for experimental work at higher stress levels to further elaborate on the findings of these exploratory efforts. (Author)

Chemical Engineering

ARF-3187-5 $4.60

Armour Research Foundation, Chicago, Ill.
ELECTROSTATIC CLASSIFICATION OF SUBMICRON AIRBORNE PARTICLES, by G. Langer. Final rept. on Contract AT(11-1)-578. Aug 61, 47p.

BMI-1539 $1.00

Battelle Memorial Inst., Columbus, Ohio.
DEVELOPMENT OF CONTAINER MATERIALS FOR THE FUSED CHLORIDE-ELECTROLYTIC FUEL-RECOVERY PROCESS, by Paul D. Miller, Earl L. White and others. Rept. on Contract W-7405-eng-92. Aug 61, 41p.

HW-SA-2212 $1.60

Hanford Atomic Products Operation, Richland, Wash.
AUTOMATION OF A CONTINUOUS CALCINER, by R. Y. Lon, and N. P. Wilburn. June 61, 13p.

TID-13227 $1.10

[Laboratories for Research and Development] Franklin Inst., Philadelphia, Pa.
APPARATUS FOR CLEAVING METAL CRYSTALS IN VACUUM, by James B. Drew. 6p.

PB 181 035 $1.00

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
PRODUCING SELECTIVELY INFRARED-REFLECTING SURFACES ON PLASTIC FILMS FOR SOLAR STILLS, by Robert A. Erb, Edmund Thelen and F. L. Jackson. Rept. 1 June 60-31 July 61, on Contract 14-01-001-201. Oct 61, 37p. 5 refs. Rept. no. F-A2429; Saline Water Research and Development progress rept. no. 53.

DESCRIPTORS: *Plastic films, *Metal films, *Coatings, *Infrared filters, Production, Costs, Solar energy, *Sea water, *Desalination, Distilling plants, Reflection, Surfaces.

Basic considerations of radiant energy behavior in solar still systems are discussed with conclusions presented as to the limitations of still design on the use of selectively infrared-reflecting coatings. Two classes of infrared coatings are discussed: thin metal films, and interference reflection filters (single and multiple-film types). The overall conclusions presented are that the metal film approach is technically infeasible (will not conserve energy), and that the interference coating approach is technically feasible but economically infeasible.

TID-13355 $2.60

Monsanto Research Corp., Everett, Mass.
ORGANIC COOLANT RECLAMATION, by R. J. Wineman, J. S. Adams, and D. A. Scola. Quarterly rept. no. 9, 15 Mar-15 June 61, on Contract AT(10-1)-1088. July 61, 29p.

ORNL-3142 $0.75

Oak Ridge National Lab., Tenn.
FUEL CYCLE DEVELOPMENT. Semiannual progress rept. for period ending 31 Mar 61 on Contract W-7405-eng-26. 30p.

ORNL-3143 $0.50

Oak Ridge National Lab., Tenn.
MISCELLANEOUS EXPERIMENTS RELATING TO THE PROCESSING OF CETR FUEL BY SULFEX-THOREX AND DAREX-THOREX PROCESSES, by L. M. Ferris and A. H. Kibbey. Rept. on Contract W-7405-eng-26. 17p.

ORNL-TM-7 $1.60

Oak Ridge National Lab., Tenn.
PILOT PLANT SHUTDOWN AND Pu-Al PROCESSING, by J. C. Bresee. Sep 61, 20p.

ORNL-3101 $0.50

Oak Ridge National Lab., Tenn.
PROCESSING OF URANIUM CARBIDE REACTOR FUELS. I. REACTION WITH WATER AND HCl, by M. J. Bradley and L. M. Ferris. Rept. on Contract W-7405-eng-26. 19p.

ORNL-3106 $1.00

Oak Ridge National Lab., Tenn.
SOLVENT EXTRACTION OF URANIUM FROM CARBONATE SOLUTIONS, by F. G. Seeley, F. J. Hurst, and D. J. Crouse. Rept. on Contract W-7405-eng-26. 42p.

IDO-14523 $2.00

Phillips Petroleum Co., Idaho Falls.
LABORATORY STUDIES FOR HTRE FUEL REPROCESSING, by R. D. Cannon, B. E. Paige, and K. L. Rohde. Rept. on Contract AT(10-1)-205. June 61, 90p.

DP-602 $0.50

Savannah River Lab., Aiken, S. C.
PREPARATION OF URANIUM (IV) NITRATE SOLUTIONS, by Robert S. Ondrejcin. Rept. on Contract AT(07-2)-1. July 61, 10p.

PB 181 036 $3.00

Texas A. and M. Coll., College Station.
DEVELOPMENT OF THE SOLVENT DEMINERALIZATION OF SALINE WATER, by Richard Davison, A. F. Isbell and others. Annual rept. 31 Mar 59-15 Nov 60, on Contract 14-01-001-174, continuation of Contracts 14-01-001-60, 14-01-001-77 and 14-10-001-106. Sep 61, 186p. 13 refs. Saline Water Research and Development progress rept. no. 55.

DESCRIPTORS: *Sea water, *Desalination, *Organic solvents, *Amines, *Butyl methyl ether, *Pyrroles, Methyl radicals, *Amides, Phosphorus compounds, Physical properties, Synthesis, Thermodynamics.

Contents:
Introduction
Description of process
Physical properties of solvents: primary, secondary, tertiary, mixed tertiary, and secondary and tertiary amines; alkylated morpholines; amino alcohols; polyoxyamines; heterocyclic amines; esters; ethers; glycol ethers; sorbitol derivatives; phosphorus compounds; miscellaneous compounds
Synthesis of solvents for water desalination: preparation of n-methylamines, tertiary amines, methyl-t-butyl ether, alkylphosphonamides, and n-methylpyrrole
Test runs on desalination of brackish water with laboratory model
Cost estimations
Solvent recovery
Analytical methods
Thermodynamics: the calculation of the consolute temperature and solubility curve from thermodynamic data; solvent selectivity; reversible cycles
Conclusions

Electrical and Electronic Engineering

AD-258 642 $2.60

Applied Research Lab., U. of Arizona, Tucson.
SELECTIVE AMPLITUDE SAMPLING, by Leo R. Spogen, Jr., Harry N. Shaver and others. Final rept. on Contract DA 36-039-sc-80146. Jan 61, 30p. Supplement no. 1 to AEPG-SIG 960-73, AD-210 550.

This report released by the cognizant military agency for sale to the public 13 Oct 61.

DESCRIPTORS: *Communication theory, *Speech transmission, *Speech representation, Sampling, *Amplitude modulation, Selection, Communication systems.

This report discusses selective amplitude sampling which may be used in rf transmission in the form of pulse amplitude modulation, pulse duration modulation, or pulse position modulation. The techniques that may be used to obtain these modulation forms are discussed. A preliminary discussion of noise properties that will produce a degradation of intelligibility and quality of the signal in these basic forms is included. (Author)

PB 181 012 $0.50

Bureau of Naval Weapons, Washington, D. C.
AF SUBSTITUTION ATTENUATOR, WEINSCHEL CR-1. BuWeps-Sushipe Calibration Program. 27 June 61, 17p. Secondary Standards Lab. Instrument Calibration Procedure GA-02.

DESCRIPTORS: *Audiofrequency attenuators, Calibration, Instrumentation, Instruction manuals.

The test Instrument is a precision audio attenuator typically applied in RF attenuation measurement systems using an audio substitution technique.

PB 181 015 $0.50

Bureau of Naval Weapons, Washington, D. C.
AUDIO LEVEL INDICATOR, WEINSCHEL IN-1. BuWeps-BuShips Calibration Program. 18 Dec 59, 17p. Secondary Standards Lab. Instrument Calibration Procedure GD-03.

DESCRIPTORS: *Tuned amplifiers, Calibration, Instrumentation, Instruction manuals.

PB 181 011 $0.50

Bureau of Naval Weapons, Washington, D. C.
BRIDGE, IMPEDANCE, ELECTRO-MEASUREMENTS 250 DA AND AN/URM-90. BuWeps-BuShips Calibration Program. 18 May 59, 19p. Secondary Standards Lab. Instrument Calibration Procedure AZ-02.

DESCRIPTORS: *Impedance bridges, Calibration, Instrumentation, Instruction manuals.

The Test Instrument is an impedance bridge capable of measuring resistance, capacitance, and inductance. It consists of a power supply, a galvanometer, a 1-kc oscillator, an amplifier, a tuning eye null indicator, and the bridge circuits.

PB 181 017 $0.50

Bureau of Naval Weapons, Washington, D. C.
CRYSTAL TEST SET TS-268/U THROUGH TS-268E/U. BuWeps-BuShips Calibration Program. 16 Apr 60, 6p. Secondary Standards Lab. Instrument Calibration Procedure GD-06.

DESCRIPTORS: *Test sets, Calibration, Instrumentation, Instruction manuals, Diodes, Test equipment.

The Test Instrument is a portable test unit designed to test the characteristics of crystal diodes by measuring forward and reverse resistance and reverse current.

PB 181 014 $0.50

Bureau of Naval Weapons, Washington, D. C.
DETECTOR MOUNT, J-BAND WAVEGUIDE TYPES (1-1/2" x 3/4" WAVEGUIDE SIZE). BuWeps-BuShips Calibration Program. 31 July 59, 20p. Secondary Standards Lab. Calibration Procedure GD-02.

DESCRIPTORS: *Radiofrequency power, Measurement, Detection, Instrumentation, *Crystal detectors, *Bolometers, J-band, Waveguides, Calibration, Instruction manuals.

This procedure describes the calibration of J-band Detector Mounts of 1-1/2" x 3/4" waveguide size, outside dimensions, (tuned crystal or either tuned or untuned bolometer).

PB 181 016 $0.50

Bureau of Naval Weapons, Washington, D. C. DETECTOR MOUNT, S-BAND (2.60 TO 3.95 KMC). BuWeps-BuShips Calibration Program. 29 Feb 60, 14p. Secondary Standards Lab. Instrument Calibration Procedure GD-04.

DESCRIPTORS: *Radiofrequency power, Measurement, Detection, Instrumentation, *Bolometers, S-band, Calibration, Instruction manuals.

This procedure describes the calibration of S-band detector mounts of 1 1/2" x 3" waveguide size (outside dimensions).

PB 181 013 $0.50

Bureau of Naval Weapons, Washington, D. C. DETECTOR MOUNT X-BAND WAVEGUIDE TYPES. BuWeps-BuShips Calibration Program. 7 May 59, 20p. Secondary Standards Lab. Instrumentation Procedure GD-01.

DESCRIPTORS: *Radiofrequency power, Measurement, Detection, Instrumentation, *Crystal detectors, *Bolometers, X-band, Waveguides, Calibration, Instruction manuals.

This procedure describes the calibration of X-band waveguide type Detector Mounts (tuned crystal or either tuned or untuned bolometer).

PB 181 002 $0.50

Bureau of Naval Weapons, Washington, D. C. FREQUENCY METER, HEWLETT PACKARD MODEL 500B, AND TACHOMETER INDICATOR, HEWLETT PACKARD 500C. BuWeps-BuShips Calibration Program. 23 Dec 59, rev. 25 May 60, 25p. Secondary Standards Lab. Instrument Calibration Procedure AF-18.

DESCRIPTORS: *Frequency meters, Calibration, Instrumentation, Instruction manuals, Tachometers, Meters.

The Test Instrument is an electronic frequency meter calibrated in cps (HP 500B) or in rpm (HP 500C). Controls are provided for input sensitivity, range selection, and scale expansion.

PB 181 004 $0.50

Bureau of Naval Weapons, Washington, D. C. GENERAL RADIO 1215-B UNIT OSCILLATOR. BuWeps-BuShips Calibration Program. 18 Mar 59, rev. 31 May 60. 16p. Secondary Standards Lab. Instrument Calibration Procedure AG-16, supersedes AG-22.

DESCRIPTORS: Radio, *Oscillators, Calibration, Instrumentation, Instruction manuals

The Test Instrument is a compact oscillator that has a frequency range from 50 to 250 Mc. It requires an external power supply and can be amplitude modulated by an external audio source.

PB 181 003 $0.50

Bureau of Naval Weapons, Washington, D. C. GENERATOR, SQUARE WAVE, TEKTRONIX 105. BuWeps-BuShips Calibration Program. 22 Oct 58, rev. 27 May 60, 25p. Secondary Standards Lab. Instrument Calibration Procedure AG-04.

DESCRIPTORS: *Generators, Calibration, Instrumentation, Instruction manuals.

The Test Instrument is a square-wave generator which generates fast rise time square waves, which are variable in frequency and amplitude, and a synchronizing signal. The Test Instrument can also be synchronized with an external signal.

PB 181 001 $0.50

Bureau of Naval Weapons, Washington, D. C. GERTSCH FM-3 FREQUENCY METER, BuWeps-BuShips Calibration Program. 20 May 59, 16p. Secondary Standards Lab. Instrument Calibration Procedure AF-10.

DESCRIPTORS: *Frequency meters, *Signal generators Calibration, Instrumentation, Instruction manuals, Meters, *Signal generators.

PB 181 019 $0.50

Bureau of Naval Weapons, Washington, D. C. J-BAND DIRECTIONAL COUPLERS (1-1/2" x 3/4" WAVEGUIDE SIZE). BuWeps-BuShips Calibration Program. 5 Aug 59, 22p. Secondary Standards Lab. Instrument Calibration Procedure GN-02.

DESCRIPTORS: *Waveguide couplers, J-band, Calibration, Instrumentation, Instruction manuals.

This procedure describes the calibration of J-band microwave directional couplers of waveguide size 1 1/2" x 3/4" (outside dimensions).

PB 181 000 $0.50

Bureau of Naval Weapons, Washington, D. C. KIN TEL 111B AMPLIFIERS. BuWeps-BuShips Calibration Program. 9 July 59, 16p. Secondary Standards Lab. Instrument Calibration Procedure AA-09.

DESCRIPTORS: *Amplifiers, Calibration, Instrumentation, Instruction manuals.

PB 181 024 $0.50

Bureau of Naval Weapons, Washington, D. C. MICROWAVE FREQUENCY, J-BAND (5.85 TO 8.2 KMCPS. BuWeps-BuShips Calibration Program. 29 June 59, 14p. Secondary Standards Lab. Measurement System Operation Procedure HF-03.

DESCRIPTORS: *Frequency meters, *Microwave frequency, J-band, Calibration, Instrumentation, Instruction manuals.

This procedure describes the operation of a secondary standard calibration system which is used to calibrate J-Band Microwave Frequency Meters of waveguide size 3/4" x 1 1/2" (outside dimensions).

PB 181 023 $0.50

Bureau of Naval Weapons, Washington, D. C.
OPTICAL TORQUE TESTER, STURTEVANT MODEL OTT 500 AND 165. BuWeps-BuShips Calibration Program. 26 June 61, 16p. Secondary Standards Lab. Instrument Calibration Procedure MU-02.

DESCRIPTORS: *Torque, Test equipment, Calibration, Instrumentation, Instruction manuals.

The Test Instrument consists of an internal torque measuring element and an optical system which is used to project the measuring element deflection to the multiple-scale screen.

PB 181 005 $0.50

Bureau of Naval Weapons, Washington, D. C.
OSCILLATORS, AUDIO DIAL TYPE. BuWeps-BuShips Calibration Program. 25 Mar 60, 30p. Secondary Standards Lab. Instrument Calibration Procedure AG-34.

DESCRIPTORS: *Audiofrequency oscillators, Calibration, Instrumentation, Instruction manuals, Oscillators

This procedure describes the calibration of dial type audio oscillators. The range of measurements is as follows: Frequency: 0. to 1 Mc; Output: 0. 001 to 300 volts from 10 cps to 4 Mc; Distortion: 20 cps to 20 kc; 0. 1% or greater, using the distortion analyzer, 0. 01 to 20 cps, and 20 to 300 kc; 5% or greater, using observation of waveform technique; Rise time: 0. 1 μ sec or greater; Attenuation: 60 db in 10 db steps (0 db = 1 volt) Regulation is tested by monitoring both frequency and amplitude of the Test Instrument output while the line voltage is changed from 105 to 125 volts.

PB 181 009 $0.50

Bureau of Naval Weapons, Washington, D. C.
OSCILLOSCOPE: HP 150A AND AMPLIFIERS, HP 151A OR HP 152A. BuWeps-BuShips Calibration Program. 18 Dec 59, 41p. Secondary Standards Lab. Instrument Calibration Procedure AW-10, supersedes AW-11.

DESCRIPTORS: Broadband, *Oscilloscopes, *Oscilloscope amplifiers, Calibration, Instrumentation, Instruction manuals

The Test Instrument is a general purpose broadband oscilloscope which includes triggered sweeps, calibrated sweep times, calibrated expanded sweep times and a square wave calibrator. Either a high gain vertical preamplifier or a dual channel vertical preamplifier may be installed in the Test Instrument.

PB 181 010 $0.50

Bureau of Naval Weapons, Washington, D. C.
PHASE STANDARD, SECONDARY, ACTON LABORATORIES 709A. BuWeps-BuShips Calibration Program. 24 Nov 58, 42p. Secondary Standards Lab. Instrument Calibration Procedure AZ-01.

DESCRIPTORS: *Phase shifters, Calibration, Instrumentation, Instruction manuals.

PB 181 020 $0.50

Bureau of Naval Weapons, Washington, D. C.
POWER BRIDGE, UNIVERSAL, POLYTECHNIC RESEARCH AND DEVELOPMENT CO. TYPE 650-A & 650-B. BuWeps-BuShips Calibration Program. 15 Jan 60, 19p. Secondary Standards Lab. Instrument Calibration Procedure GP-03.

DESCRIPTORS: *Radiofrequency power, Measurement, Instrumentation, *Bolometers, *Electric bridges, Calibration, Instruction manuals.

The Test Instrument is a self-balancing bolometer bridge capable of measuring RF power in ranges from 0. 1 to 100 mw.

PB 181 007 $0.50

Bureau of Naval Weapons, Washington, D. C.
POWER SUPPLY, UNIT REGULATED, GENERAL RADIO 1201-A. BuWeps-BuShips Calibration Program. 31 Dec 58, 10p. Secondary Standards Lab. Instrument Calibration Procedure AH-03, supersedes AH-07.

DESCRIPTORS: Radio, *Power supplies, Calibration, Instrumentation, Instruction manuals.

The Test Instrument is a compact, regulated power supply designed primarily to furnish filament and B+ voltages to GR unit instruments.

PB 181 022 $0.50

Bureau of Naval Weapons, Washington, D. C.
PRESSURE GAGES, BOURDON TUBE TYPE (35 TO 20, 000 PSIG). BuWeps-BuShips Calibration Program. 25 Feb 60, 13p. Secondary Standards Lab. Instrument Calibration Procedure MP-01.

DESCRIPTORS: *Pressure gages, Calibration Instrumentation, Instruction manuals.

This procedure describes the calibration of bourdon tube pressure gages with accuracies from 0. 1% to 0. 5%, and within the range of 35 to 20, 000 psig.

PB 181 006 $0.50

Bureau of Naval Weapons, Washington, D. C.
TEST OSCILLATOR TS-47/APR. BuWeps-BuShips Calibration Program. 27 June 61, 19p. Standards Lab. Instrument Calibration Procedure AG-59.

DESCRIPTORS: *Radio frequency oscillators, Calibration, Instrumentation, Instruction manuals, Oscillators.

The Test Instrument is an RF oscillator with a power output varying between 0. 9 and 6. 0 milliwatts, depending on frequency. Line voltage variations of 10 per cent of nominal do not reduce the output below the minimum specified levels. The frequency range is 40 to 500 Mc, and the oscillator can be modulated by a 1000 cps sine wave, or by 70-microsecond pulses at 500 pulses per second.

PB 181 021 $0.50

Bureau of Naval Weapons, Washington, D. C.
TEST SET, RADAR TS-295/UP, TS-295A/UP, TS-295C/UP. BuWeps-Bushipe Calibration Program. 7 Mar 60, 17p. Secondary Standards Lab. Instrument Calibration Procedure GQ-1

DESCRIPTORS: *Test sets, Radar, Calibration, Instrumentation, Instruction manuals.

The Test Instrument is primarily a power and frequency measuring set operating in the 3400 to 3900-Mc band.

PB 181 008 $0.50

Bureau of Naval Weapons, Washington, D. C.
TRANSFER OSCILLATOR, HEWLETT PACKARD 540A OR 540B. BuWeps-BuShips Calibration Program. 9 May 60, 23p. Standards Lab. Instrument Calibration Procedure AQ-12.

DESCRIPTORS: *Oscillators, Calibration, Instrumentation, Instruction manuals, *Radiofrequency oscillators.

The Test Instrument is a transfer oscillator capable of extending the range of electronic frequency counters from 10 Mc to 12.4 KMc and beyond. Frequency comparison is made by means of a variable frequency oscillator; a broadband, untuned, diode mixer system; a video amplifier; and an oscilloscope zero beat indicator.

PB 181 018 $0.50

Bureau of Naval Weapons, Washington, D. C.
X-BAND DIRECTIONAL COUPLERS. BuWeps-BuShips Calibration Program. 14 May 59, 22p. Secondary Standards Lab. Instrument Calibration Procedure GN-01.

DESCRIPTORS: *Waveguide couplers, X-band, Calibration, Instrumentation, Instruction manuals.

This procedure describes the calibration of X-band microwave directional couplers of waveguide size 1/2" x 1" (outside dimensions).

PB 158 048 $1.60

California U., Los Angeles.
SOME PROPERTIES OF STOCHASTIC TIME OPTIMAL CONTROL SYSTEMS, by Masanao Aoki. Rept. on Contract Nonr-233(52). Nov 60, 16p. 10 refs. Dept. of Engineering rept. no. 60-100; AD-250 150.

DESCRIPTORS: *Servomechanisms, Servo systems, Control systems, Mathematical analysis.

Some properties of stochastic time optimal control systems are described and especially, it is shown that under certain conditions optimal control variables, if they exist, will be of the bang-bang type. (Author)

TID-13587 $1.10

Laboratories for Applied Sciences, U. of Chicago, Ill.
THE CHANNELED IMAGE INTENSIFIER. Quarterly rept. no. 12, Apr-June 61, on Contract AT(11-1)-647. 7p.

TID-13423 $1.60

Missouri U. School of Mines and Metallurgy, Rolla.
FRACTIONATION OF FISSION ELEMENTS BY ELECTRODIALYSIS, by G. J. Bud, J. D. Vie, and W. H. Webb. 17p.

UNM-TR-EE-55 $6.60

New Mexico U. Engineering Experiment Station, Albuquerque.
THEORY AND FABRICATION OF POINT CONTACT DIODES UTILIZING REDUCED SINGLE CRYSTAL RUTILE TiO_2, by Goebel Davis, Jr. and W. W. Grannemann. May 61, 62p. SCDC-2346.

ORNL-3098 $2.50

Oak Ridge National Lab., Tenn.
THE DEVELOPMENT OF A DIRECT COUPLED, TRANSISTORIZED, SUB-MILLIMICROAMPERE CURRENT AMPLIFIER, by F. T. May. Rept. on Contract W-7405-eng-26. 116p.

TID-13588 $3.60

Physical Sciences Corp., Pasadena, Calif.
60 CONDUCTOR HIGH TEMPERATURE RADIATION RESISTANT FLEXIBLE CABLE. Mar 61, 31p.

SCTM-151-61(72) $0.50

Sandia Corp., Albuquerque, N. Mex.
AMT-4 RADISONDE TRANSMITTER MODIFICATION ASSEMBLY (USING THE NEW ALUMINUM-OXIDE HUMIDITY ELEMENT), by C. M. Stover. Sep 61, 11p.

SCTM-208-61(11) $0.75

Sandia Corp., Albuquerque, N. Mex.
DIELECTRIC BREAKDOWN OF PRINTED WIRING ASSEMBLIES IN ELECTRONIC PACKAGES, by Robert P. Noble. Aug 61, 21p.

SCTM-20-61-81 $1.60

Sandia Corp., Albuquerque, N. Mex.
A HIGH-G ACCELEROMETER CALIBRATOR, by D. F. Lange. Rept. on Contract AT(29-1)-789. Aug 61, 14p.

PB 149 947 $5.60

Stanford Electronics Labs., Stanford U., Calif.
SOLID-STATE ELECTRONICS RESEARCH. Consolidated quarterly status rept. no. 4, 1 July-30 Sep 59, on Contracts Nonr-225(31), (44), (24); DA 36-039-sc-(78272, 73178, 78296); AF 33(616)6207, and AF 19(604)5480. 1959, 56p. 31 refs.

DESCRIPTORS: *Electronic equipment, Microwave equipment, *Electron tubes, *Backward wave amplifiers, Traveling wave tubes, *Semiconductors, *Transistors, *Radiofrequency attenuators, *Electronic circuits, *Delay lines, Silicon, Oxides.

PB 147 650 $3.60

Stanford Electronics Labs., Stanford U., Calif.
SOLID-STATE ELECTRONICS RESEARCH. Consolidated quarterly status rept. no. 6, 1 Jan-31 Mar 60, on Contracts Nonr 225(31), (44), (24); DA 36-039-sc-78272, 73178, 78296; AF 33(616)6207. [1960] 39p. 4 refs. AD-236 848.

DESCRIPTORS: *Electronic equipment, Microwave equipment, *Electron tubes, *Backward wave amplifiers, Traveling wave tubes, *Semiconductors, *Transistors, *Radiofrequency attenuators, *Electronic circuits, *Delay lines, Silicon, Oxides.

Contents: Design of systems to tolerate variable transistors; Application of magnetoresistance to analogue multiplication; Experimental verification of noise model for semiconductor devices; Neuristor studies; Noise producing mechanisms in solid-state devices; Improvement of reliability by redundance and adaption; Switching type regulators; Multi-stage tuned-amplifier design; Logarithmic video attenuators; AGC circuits for large signals; VHF i-f amplifiers; Variable delay lines for phase modulation; Phenomena occurring in semiconductors in high electric fields; Variable capacitance semiconductor diodes; Experimental noise studies; Thin-film silicon-carbide devices; Solid-state microwave amplifying and generating devices; Large-signal analysis of nonlinear transmission lines; High-level injection studies; Carrier storage in transistors; Wideband transistor amplifiers; High-speed high-current switching devices; Broadband maser amplifier; Parametric amplifiers; Solid-state masers; Parametric circuits; Solid-state traveling-wave parametric amplifier. (See also PB 149 947)

CTSL-18 $2.60

Synchrotron Lab., Calif. Inst. of Tech., Pasadena.
A 50 NANOSECOND LINEAR GATE CIRCUIT USING TRANSISTORS, by Arpad Barna and J. Howard Marshall. Rept. on Contract AT(11-1)-68. Feb 61, 21p.

CTSL-27 $2.60

Synchrotron Lab., Calif. Inst. of Tech., Pasadena.
A DISTRIBUTED AMPLIFIER USING TRANSISTORS, by Arpad Barna and J. Howard Marshall. Rept. on Contract AT(11-1)-68. 28 Apr 61, 27p.

CTSL-23 $3.60

Synchrotron Lab., Calif. Inst. of Tech., Pasadena.
MEASUREMENT OF SOME TRANSISTOR PARAMETERS, by Arpad Barna. Rept. on Contract AT(11-1)-68. 29 Mar 61, 32p.

CTSL-17 $3.60

Synchrotron Lab., Calif. Inst. of Tech., Pasadena.
A MULTIFOLD COINCIDENCE-VETO CIRCUIT USING TRANSISTORS, by Arpad Barna, J. Howard Marshall, and Matthew Sands. 7 Feb 61, 37p.

CTSL-22 $2.60

Synchrotron Lab., Calif. Inst. of Tech., Pasadena.
SOME TRANSISTOR SMALL SIGNAL EQUIVALENT CIRCUIT CALCULATIONS, by Arpad Barna. Contract AT(11-1)-68. 28 Mar 61, 29p.

Ordnance, Missiles, and Satellite Vehicles

PB 149 890 $10.50

Air Force Missile Test Center, Patrick AFB, Fla.
THE DETERMINATION OF ASKANIA CINE-THEODOLITE CALIBRATION COEFFICIENTS, by Jerome L. Sibol. Rept. on Missile Test Project, Subcontract to Contract AF 08(606)3413. Apr 60, 136p. 9 refs. RCA Data Processing Technical rept. no. 58; AFMTC-TR-60-9; AD-240 950.

DESCRIPTORS: *Phototheodolites, Calibration, *Data processing systems, *Guided missile tracking systems.

The field procedures and data reduction procedures for determination of the calibration coefficients of Askania Cine-theodolites are presented. Methods are given for determining azimuth and elevation dial eccentricities and for determining lens bend and standards error. Also discussed is the method of determining azimuth collimation, aximuth and elevation dial zeroing, and mislevel. Conclusions and recommendations are given. (Author)

PB 155 668 $1.10

Army Signal Missile Support Agency, White Sands Missile Range, N. Mex.
DETERMINATION OF TRAJECTORIES USING RANGE DATA FROM THREE NONCOLINEAR RADAR STATIONS, by Larry Armijo. Sep 60, 9p. Technical memo. no. 766; AD-242 762.

DESCRIPTORS: *Rocket trajectories, Determination, Radar ranges, Errors, Radar stations, *Guided missile trajectories, Radar tracking.

A procedure for determining the trajectory of an object from range data from three noncolinear radar stations is presented. A method is given for estimating uncertainties in position data assuming only uncertainties in the range data. (Author)

PB 171 809-2 $1.00

Cryogenic Engineering Lab., National Bureau of Standards, Boulder, Colo.
CRYOGENIC MATERIALS DATA HANDBOOK, by T. F. Durham, R. M. McClintock, and R. P. Reed. Quarterly supplement 2 on Contract AF 04(647)59-3. Sep 61, 167p. 8 refs.

DESCRIPTORS: *Cryogenics, Metals, Materials, *Low temperature research, Mechanical properties, Handbooks, Aluminum, Stainless steel, Titanium, Beryllium, Nickel, Copper, Vanadium, Tensile properties, *Guided missiles.

See also PB 171 809-1

PB 157 949 $8.60

Hoffman Labs., Inc., Los Angeles, Calif.
DESIGN STUDY OF A STATIC SOLAR ELECTRICAL POWER SYSTEM, by Louis A. Ule and Joseph S. Smatko. Rept. on Contract AF 33(616)6617. Mar 60, 97p. 6 refs. WADC Technical note 59-380; AD-237 181.

DESCRIPTORS: *Power supplies, *Satellite vehicles, Solar energy, Photoelectric cells, Design, *Electric power production.

A design study of the parameters affecting the design of a static solar electrical power system for earth-orbiting satellites is presented. This power system is to be capable of reliable operation over a period of one year. Two basic orientation systems were studied in detail. One involves mounting of the solar cell converter panels at the top of the vehicle and the other involves a side mounted panel. The side mounted panel was selected since it produces the smaller disturbance to the vehicle. A battery test program was outlined to determine the permissible depth of discharge of nickel-cadmium batteries for a lifetime of one year at the charge-discharge rates called for in this system. Studies were made on converter panels which have the highest efficiency in a space environment. Glass covers and coatings of cells and panels are considered. Other studies were presented including the optimum design of the voltage regulating system, the design of various types of brushless DC motors, the investigation of liquid metal bearings and slip rings, and a system error analysis. (Author)

PB 158 091 $4.60

Illinois U. [Urbana].
A STUDY OF THE KINEMATICS OF BUOYANT-BODY WATER EXIT, PART II. VERTICAL EXIT RESULTS, by M. E. Clark and J. M. Robertson. Rept. on Contract Nonr-1834(10). Nov 60, 50p. 5 refs. T. & A. M. rept. no. 181; AD-249 917.

DESCRIPTORS: *Guided missiles, Underwater to surface, *Underwater ballistics, Underwater ordnance, Hydrodynamics, Buoyant materials, Vertical indicators

The behavior of buoyant ellipsoidal bodies passing vertically through a fluid-fluid (usually water-air) interface are reported. The studies involved bodies of 1 to 4 inches diameter and specific gravities of 0.20 to 0.75. The Froude number range of the tests was lowered to 1.2 via the use of a viscous liquid and raised to 23 by use of a submerged interface situation, i.e., a body of fresh water floating over a body of salt water. The velocity increase experienced by the body during the surface-piercing phase was found to be characterized by a parameter involving the added mass coefficient and specific gravity of the body. The parameter increased with Froude number. The behavior of the bodies before they pierced the surface indicates a lack of Froude number effect above values of 1.2 and a change in nature of the occurrences between 0 and 1.2. The maximum accelerations experienced by the bodies were found to be roughly correlated by a parameter involving the added-mass coefficient, specific gravity, and fineness ratio of the body. This parameter appears to increase with the square of the Froude number. Some additional measurements of the water entrained by the exiting body suggest that all of this water comes out with the body and not following it. The velocity increases observed are only a few percent and while the accelerations are quite large both quantities are considerably less than predicted by the elementary momentum analysis. (Author)

AD-262 719 repriced $0.75

Naval Ordnance Lab., White Oak, Md.
THE RESPONSE OF ELECTRO-EXPLOSIVE DEVICES TO TRANSIENT ELECTRICAL PULSES, by I. Kabik, L. A. Rosenthal (Rutgers U.) and A. D. Solem. 17 Apr 61, 23p. 3 refs. NOLTR 61-20

DESCRIPTORS: *Explosives, Detonation, Electricity, Heat production, Energy, *Transducers, *Electric bridges, Wire, Firing mechanisms, *Electric detonators, *Electric igniters, Tests, Mathematical analysis

The electro-explosive device is viewed as an energy transducer converting electrical input energies into heat in the explosive system. The basic thermal equation governing the behavior of the system is taken as

$$C_p \frac{d\theta}{dt} + \gamma\theta = P(t)$$

where C_p is the heat capacity of the system, γ is the heat loss factor, θ is the temperature rise, and $P(t)$ is the time-dependent power input function. This equation is solved for constant current, capacitor discharge, 5-megacycle RF, and typical radar input energies. The solutions are compared with experimental firings of the Squib Mk 1 Mod 0. This model in conjunction with the hot-spot theory of explosive initiation represents well the observed firing responses of the Squib Mk 1 Mod 0. (Author)

AD-255 297 $2.60

RCA Service Co., Inc. Patrick Air Force Base, Fla.
AMR INFRARED VAN, by D. C. Marquis, R. L. Carney, and J. Sibol. Engineering rept. 24 Feb 61, 61p. AFMTC TN-61-3.

This report released by the cognizant military agency for sale to the public 13 Oct 61.

DESCRIPTORS: *Guided missiles, Surface to surface, Infrared equipment, *Infrared tracking, Radiometers, Photographic equipment, Television equipment, Sulfides, *Television tracking systems, Magnetic recording systems, *Infrared optical systems, *Optical tracking, *Guided missile tracking systems, Measurement, Mathematical analysis, Thermistors, Lead compounds, Data, Instrumentation, Spectrographic data, Collecting methods, *Data processing systems, *Radar trailers.

A description of the infrared measurements program at AFMTC is given. The equipment, the operation and the data reduction methods are explained. This system is a three-channel system employing a two-channel eight-inch radiometer and a one-channel four-inch radiometer. The coverage of each channel is as follows: Channel A uses a thermistor detector with KRS-5 window whose unfiltered response is from 0.6 to 35 microns. Channel B uses a PbS detector with germanium window whose response is from 1.8 to 2.7 microns. Channel C uses a

thermistor detector with sapphire window whose unfiltered response is from 0.6 to 6 microns. The data is reduced by a routine called FIRE. An explanation of the methods and formulas used for obtaining range, aspect angle, altitude, radiant flux, irradiance, and apparent radiant intensity is given. The method used for calculating the atmospheric attenuation is based on the Taylor and Yates measurements. The equipment is used on all ballistic missile launchings from Cape Canaveral and adjacent waters. (Author)

PB 155 341 $2.60

Stanford Research Inst., Menlo Park, Calif.
CALCULATION OF THE OSCULATING ELEMENTS OF THE ORBIT OF A NEAR-EARTH SATELLITE, by J. L. Brenner. Interim technical rept. no. 4 on Contract AF 29(600)1773. 31 July 59, 28p. 4 refs. SRI Proj. no. SU-2587; AD-250 355, pt. 4

DESCRIPTORS: Satellite vehicles, *Satellite vehicle trajectories, Theory, *Earth, *Gravity, Mathematical analysis, Differential equations.

The equations of motion which have been derived can be used to calculate the osculating elements of the orbit of a near-earth satellite. The equations needed for this calculation are derived in this report. This report is a supplement to AFMDC TR-59-27, and should be used in conjunction with it. (Author)

PB 155 342 $1.60

Stanford Research Inst., Menlo Park, Calif.
METHODS FOR SATELLITE ORBIT CALCULATION THEORY AND APPLICATIONS, by J. L. Brenner, R. Fulton and others. Final rept. on Contract AF 29(600)1773. 31 Aug 59, 13p. 6 refs. SRI Proj. no. SU-2587; AD-250 355.

DESCRIPTORS: Satellite vehicles, *Satellite vehicle trajectories, Theory, *Earth, *Gravity, Mathematical analysis, Differential equations.

A plane II is determined by giving (i) its inclination I with the equatorial plane, and (ii) the longitude Ω of its intersection χ with the e.p., as functions of time: $I = I(t), \Omega = \Omega(t)$. Polar coordinates (with χ as prime direction) locate satellite S in plane II. Neglecting drag, the equations of motion are integrated by a perturbation procedure, the theory is applied to the Vanguard I orbit (1958 Beta two), and formulas are given for the "osculating elements." (Author)

Sanitation and Safety Engineering

ORNL-3147 $0.50

Oak Ridge National Lab., Tenn.
A SURVEY OF THE HAZARDS INVOLVED IN PROCESSING LIQUID METAL BONDED FUELS, by J. B. Adams. Rept. on Contract W-7405-eng-26. 17p.

PWAC-347 $2.00

Pratt and Whitney Aircraft Div., United Aircraft Corp., Middletown, Conn.
LIQUID METAL FIRE CONTROL 15 JUNE 1961. Rept. on Contract AT(11-1)-229. July 61, 84p.

K-1335(Del.) $2.60

Union Carbide Nuclear Co., Oak Ridge, Tenn.
APPLICATION OF INTERACTION CRITERIA TO HETEROGENEOUS SYSTEMS, by H. F. Henry, C. E. Newlon, and J. R. Knight. Rept. on Contract W-7405-eng-26. June 57, declassified with deletion 12 Sep 61. 23p.

K-1486 $0.75

Union Carbide Nuclear Co., Oak Ridge, Tenn.
NEUTRON ENERGY DEGRADATION BY WATER MODERATION, by Hugh F. Henry and John R. Knight. Rept. on Contract W-7405-eng-26. Sep 61, 31p.

MACHINERY, FABRICATION, AND ACCESSORY EQUIPMENT

Machine Parts and Mechanisms

PB 161 616 $1.00

Cryogenic Engineering Lab., National Bureau of Standards, Boulder, Colo.
LOAD CARRYING CAPACITY OF GAS-LUBRICATED BEARINGS WITH INHERENT ORIFICE COMPENSATION USING NITROGEN AND HELIUM GAS, by H. Sixsmith, W. A. Wilson, and B. W. Birmingham. Aug 61, 39p. 9 refs. Technical note no. 115.

DESCRIPTORS: *Thrust bearings, Load distribution, Orifices, Nitrogen, Helium, Lubricants, Tests, Gas bearings, Bearings

A static flat plate test apparatus was used to determine the load carrying capacity of circular thrust plates. The load carrying capacities of nine different pad and orifice combinations were determined experimentally using nitrogen and helium gas as the pressurizing medium. Actual load vs. plate separation curves were developed at plate supply pressures ranging from 25 to 250 psig. The paper includes a description of the apparatus in addition to the curves which were developed for gas-lubricated bearing design. (Author)

TID-13212 $8.10

Marlin-Rockwell Corp., Jamestown, N. Y.
BEARINGS FOR OPERATION IN DRY HELIUM AT 520°F. Final rept. on Contract AT(10-1)-925. May 61, 83p.

TID-13213 $4.60

Messinger Bearings, Inc., Philadelphia, Pa.
DRY RUNNING 440 C HEAT TREATED STAINLESS STEEL ANNULAR BALL BEARING IN HELIUM. Test rept. on Contract AT(10-1)-925. Mar 61, 51p.

Manufacturing Equipment and Processes

PB 181 039 $3.50

Army Ordnance Corps, Washington, D. C.
MACHINING DATA. July 61, 248p. Ordnance Corps Pamphlet ORDP 40-1.

DESCRIPTORS: *Machining, Data, Handbooks, Tools, Materials, Production, Economics, Cutting fluids, Carbide tools.

The machining recommendations presented in this book were obtained from the literature and from information provided by industry. The data from the literature consisted of recommendations from tool manufacturers, machine tool manufacturers, metals producers, handbooks, machineability reports and miscellaneous printed literature on machining. The machining information obtained from industry were recommendations for speeds and feeds that are currently being used on production operations. This data was taken, for the most part, from manuals provided by the standards departments of the various companies contacted. The machining recommendations from the various sources were correlated and then evaluated to provide the best possible recommendation for each machining operation and material.

PB 155 398 $5.60

Electronic Systems Lab., Mass. Inst. of Tech., Cambridge.
ADAPTIVE CONTROL AND CURVE-FOLLOWING DEVICES, by Carl Ernest Nielsen, Jr. Master's thesis. Technical memo. on Contract AF 33(038)24007. Sep 59, 56p. 8 refs. Rept. no. 6873-TM-11; AD-229 020.

DESCRIPTORS: *Milling machines, Templates, *Control systems, Simulation, Analog computers.

Current tracer-controlled milling machines operate with a single probe sensing the template and have a fixed system response which cannot be optimum for certain template shapes. The feasibility of utilizing additional probes is investigated to obtain future information from a template of the desired surface, to permit the system response to be varied (adapted) so that optimum following is achieved. A mathematical model of a tracer-controlled milling machine is assumed and the adaptive control theory is applied to determine the optimum control configuration for the system for 2 cases. The assumption is made that an exact knowledge of all future values of the desired surface cannot be supplied to the system. The major objective is to develop a method whereby the optimum response is closely approximated using a simplified probe arrangement on the desired surface. The multiple probes measure specific values of the desired response and supply this information continuously to a simple realization of the optimum control configuration. An analog computer was used to simulate the mathematical model and study its response to various inputs and conditions. (Author)

PB 155 523 $26.00

[Electronic Systems] Lab., Mass. Inst. of Tech., Cambridge.
AUTOMATIC DATA PREPARATION FOR NUMERICALLY CONTROLLED MACHINE TOOLS, by J. H. Runyon. Master's thesis. Rept. on Contract AF 33(038)24007. 25 Jan 56. 571p. 112 refs. Engineering rept. no. 15; D. I. C. Proj. 6873; AD-108 226.

DESCRIPTORS: *Automatic, *Programming, Mathematical computer data, *Control systems, Design, Servo systems, *Machine tools, *Milling machines, Machine tool industry, Machine shop practice, Cybernetics, Servomechanisms, Scheduling, *Electronic systems, Numerical methods and procedures.

This study is concerned with the use of Whirlwind I for the preparation of control data for the M. I. T. numerically controlled milling machine. Digital-computer programming for numerical control has been aided by the writing of 29 library subroutines. These subroutines perform commonly encountered steps in the preparation of control tapes for the M. I. T. milling machine The subroutines have been applied in routines for the preparation of control data for cylindrical surfaces (the boundaries of cams and templates), surfaces of revolution, and cones. From 75 to 90 percent of the Whirlwind I instructions in each of these routines has been obtained from library subroutines. In addition to Whirlwind I, IBM equipment at M. I. T., and four other general-purpose computers operated by commercial computing services have been used to study tape preparation for the milling machine. (Author)

PB 155 394-1 $8.10

[Electronic Systems] Lab., Mass. Inst. of Tech., Cambridge.
THE AUTOMATICALLY PROGRAMMED TOOL SYSTEM. VOLUME I. GENERAL DESCRIPTION OF THE APT SYSTEM, by Douglas T. Ross. Rept. on Contract AF 33(038)24007. [1960] 85p. AD-156 061.

DESCRIPTORS: Automatic, *Programming, *Digital computers, Control systems, Servomechanisms, Machine translation, Operation, Simulation, Documentation, Mathematical computer data, Coding, Machine tools

Contents:
Chapter 1. A general survey of APT
Chapter 2. The part programming language
Chapter 3. The system of computer programs
Chapter 4. Future developments
Chapter 5. The APT documentation
Chapter 6. (Appendix) APT project procedures

PB 155 394-2 $10.10

[Electronic Systems] Lab., Mass. Inst. of Tech., Cambridge.
THE AUTOMATICALLY PROGRAMMED TOOL SYSTEM. VOLUME II. APT PART PROGRAMMER'S MANUAL, by Douglas T. Ross. Rept. on Contract AF 33(038)24007. [1960] 130p. AD-156 062.

DESCRIPTORS: Automatic, *Programming, *Digital computers, Coding, Mathematical computer data, Instruction manuals, Machine tools.

Contents:
Chapter 1. Introduction to the APT language
Chapter 2. Word meanings-the part programming viewpoint
Chapter 3. Special problems
Chapter 4. Complete sample part programs
Chapter 5. Manual preprocessing of geometric data

Chapter 6. Processing a part program through the APT system
Chapter 7. Dictionary of preprocessing formats for geometric definitions
Chapter 8. Postprocessor language and programming requirements
Chapter 9. Check lists

PB 155 394-4 $13.00

[Electronic Systems] Lab., Mass. Inst. of Tech., Cambridge.
THE AUTOMATICALLY PROGRAMMED TOOL SYSTEM. VOLUME IV. DESCRIPTION OF APT COMPUTER PROGRAM. Rept. on Contract AF 33(038)24007. [1960] 188p. AD-156 064, Part 2.

DESCRIPTORS: Automatic, *Programming, *Digital computers, Machine translation, Control systems, Mathematical computer data, Coding, *Data processing systems, Machine tools.

Contents:
Chapter 1. Introduction
Chapter 2. Input translation program
Chapter 3. Diagnostic print routine
Chapter 4. Instruction preprocessor program
Chapter 5. Definition preprocessor program (DEFPRE)
Chapter 6. Library of surface solutions
Chapter 7. Control element program
Chapter 8. Arithmetic element program
Chapter 9. Concord postprocessor and output program
Chapter 10. Bendix postprocessor and output program

PB 155 394-5 $2.60

[Electronic Systems] Lab., Mass. Inst. of Tech., Cambridge.
THE AUTOMATICALLY PROGRAMMED TOOL SYSTEM. VOLUME V. OPERATOR'S AND TROUBLE-SHOOTER'S MANUAL, by Clarence G. Feldmann. Rept. on Contract AF 33(038)24007. [1960] 27p. AD-156 064, Part 3.

DESCRIPTORS: Automatic, *Programming, *Digital computers, Operation, Instruction manuals, Punched card methods, Mathematical computer data, Machine translation, Machine tools.

Contents:
Chapter 1. Introduction
Chapter 2. Preparing the part program
Chapter 3. Diagnostics and troubleshooting

PB 155 394-6 $5.60

[Electronic Systems] Lab., Mass. Inst. of Tech., Cambridge.
THE AUTOMATICALLY PROGRAMMED TOOL SYSTEM. VOLUME VI. MODIFICATION AND CHANGE PROCEDURES, by Clarence G. Feldmann. Rept. on Contract AF 33(038)24007. [1960] 54p. AD-156 064, Part 4.

DESCRIPTORS: Automatic, *Programming, *Digital computers, Control systems, Machine translation, Mathematical computer data, Coding, Machine tools.

Contents:
Chapter 1. Introduction
Chapter 2. Addition of a new surface type
Chapter 3. Addition of a new parameter name
Chapter 4. Addition of a new tool control instruction
Chapter 5. Addition of a new modifier
Chapter 6. Changes in input-output conventions and table sizes

PB 155 519 $10.50

[Electronic Systems] Lab., Mass. Inst. of Tech., Cambridge.
AUTOMATIC PROGRAMMING OF NUMERICALLY CONTROLLED MACHINE TOOLS, by Douglas T. Ross. Interim engineering rept. 1 Jan-30 June 58, on Contract AF 33(038)24007. [1958] 138p. 4 refs. Rept. 6873-IR-6 and 6873-IR-7; AD-156 060.

DESCRIPTORS: *Automatic, *Programming, Mathematical computer data, *Control systems, Design, Servo systems, *Machine tools, Machine tool industry, Machine shop practice, Cybernetics, Servomechanisms, Scheduling, *Electronic systems, Numerical methods and procedures.

Two Automatically Programmed Tool systems (APT systems) are being developed. One of these, an APT II system for programming by curves, is being put together in cooperation with nineteen aircraft plants. The status of this effort is described. The other APT system, an APT III system for programming by surfaces, is in the prototype stage. Previous reports have described the design of this program, and the report given here is on the current work during the reporting period. A description of an output oscilloscope program is also made. The program is used with both APT systems to draw perspective pictures of computed tool paths over a part. By this means, the results of the computation can be checked, and a photographic record obtained of the computed tool path. (Author) (See also PB 155 518)

PB 155 404 $10.50

Electronic Systems Lab., Mass. Inst. of Tech., Cambridge.
AUTOMATIC PROGRAMMING OF NUMERICALLY CONTROLLED MACHINE TOOLS, by John E. Ward. Final rept. 26 June 56-30 Nov 59, on Contract AF 33(038)24007. 15 Jan 60, 134p. 44 refs. Rept. 6873-FR-3; AD-241 754.

DESCRIPTORS: *Automatic, *Programming, Mathematical computer data, *Control systems, Design, Servo systems, *Machine tools, Machine tool industry, Machine shop practice, Cybernetics, Servomechanisms, Scheduling, Electronic systems, Numerical methods and procedures, Digital computers.

The computer programming system which has been developed is called APT (Automatically Programming Tools) and is an integrated approach to the problem of moving a tool over surfaces independent of the machine tool used. Versions of the system based on the specification of surfaces by three-dimensional space curves (APT II), and by bounded regions of surfaces (APT III), have been developed. The industrial APT II system, which operates on the IBM 704 computer, provides data

for all types of continuous-path millers currently in use. The report also summarizes work in adaptive machine-tool control, automatic feedrate control, curvilinear interpolation, and initial studies on the use of computers as aids to design, which will continue under a new contract. (See also PB 155 516)

PB 155 403 $3.60

[Electronic Systems] Lab., Mass. Inst. of Tech., Cambridge.
DESIGN, DEVELOPMENT AND EVALUATION OF A NUMERICALLY CONTROLLED MILLING MACHINE. Final rept. on Contract AF 33(038)24007. 15 Mar 56, 36p. AD-108 929.

DESCRIPTORS: *Milling machines, Design, *Control systems, *Programming, Machine tools, *Mathematical computer data, Numerical methods and procedures, Servo systems.

PB 155 402 $10.10

[Electronic Systems] Lab., Mass. Inst. of Tech., Cambridge.
ECONOMIC STUDIES OF WORK PERFORMED ON A NUMERICALLY CONTROLLED MILLING MACHINE, by Robert H. Gregory and Thomas V. Atwater, Jr. Rept. on Contract AF 33(038)24007. 1 Mar 56, 130p. 2 refs. Engineering rept. no. 18; D. I. C. Proj. 6873; AD-108 283.

DESCRIPTORS: *Milling machines, *Control systems, Manufacturing methods, Costs, *Programming, Servo systems, *Mathematical computer data, Numerical methods and procedures.

During the three year machine-evaluation phase of the M. I. T. numerically controlled milling-machine project, 76 different parts were studied. Estimates of small quantity manufacturing costs for 10 of these parts were obtained from New England job shops. Comparison of these estimates is made with cost estimates based on actual man-hours expended by M. I. T. Servomechanisms Laboratory personnel. The comparisons show numerical control is now competitive with conventional manufacturing methods, but falls short of being an unqualified economic success principally because of high costs of programming. (Author)

PB 155 400 $3.60

[Electronic Systems] Lab., Mass. Inst. of Tech., Cambridge.
INFORMATION-PROCESSING ROUTINE FOR NUMERICAL CONTROL, by Arnold Siegel. Rept. on Contract AF 33(038)24007. 1 Mar 56, 31p. 4 refs. Engineering rept. no. 16, D. I. C. Proj. 6873; AD-108 344.

DESCRIPTORS: *Data processing systems, *Digital computers, Programming, *Machine translation, *Milling machines, Control, Mathematical computer data, Coding, Machine tools.

Contents:
Chapter I. Introduction
Chapter II. The programming language
Chapter III. The translation program
Chapter IV. Discussion
Appendix. Numerical processing of definitions

PB 155 397 $10.50

Electronic Systems Lab., Mass. Inst. of Tech., Cambridge.
REQUIREMENTS FOR A CURVILINEAR INTERPOLATOR USING INCREMENTAL COMPUTATION, by Steven Allen Brambrut. Master's thesis. Technical memo. on Contract AF 33(038)24007. Sep 59, 134p. 8 refs. Rept. no. 6873-TM-10; AD-229 052.

DESCRIPTORS: *Machine tools, *Control systems, Data processing systems, *Automatic, *Programming, Mathematical computer data, Machine tool industry, Machine shop practice, Simulation, Numerical methods and procedures, Mathematical logic, Electronic systems.

The use of curvilinear interpolation in numerical control of machine tools is a relatively unexplored topic. Directors have been built which perform parabolic interpolation. These directors are most effective when cutting planar curves. The interpolator of this thesis not only enables curvilinear interpolation, but simplifies the data processing problem. The DDA is an appropriate real-time device to use in the computation process for two reasons. Its incremental properties make it compatible with existing numerically controlled tool systems, and the DDA can be programmed easily. This memorandum describes the characteristics of DDA's and explains how they are programmed and scaled. It describes the use of DDA's to perform curvilinear interpolation. A TX-0 computer program was written and used to simulate the curvilinear interpolator. The results of several examples are tabulated here and analyzed. The parts of these examples were cut to within .0013 inch. (Author)

GAMD-2298 $2.60

General Atomic, San Diego, Calif.
AN INVESTIGATION OF SOME OF THE CAUSES FOR THE SPALLING OF IMPREGNATED GRAPHITE, by W. L. Kosiba, G. R. Tully, Jr. and B. Turovlin. Project no. 32 under Contract AT(04-3)-314. 19 June 61, 27p.

GEAP-3591 $1.00

General Electric Co., San Jose, Calif.
MANUFACTURE OF THE ADHESIVE BONDED AEC SUPERHEAT CRITICAL FUEL, by W. R. Raymont and D. T. Daniels. Rept. on Contract AT(04-3)-189. Dec 60, 34p.

PB 181 040 $3.00

Paratron Corp., Carle Place, N. Y.
STUDY OF INITIAL FAILURES OF PRECISION INSTRUMENT COMPONENTS, by Joseph Berkowitz and Marvin Bierman. Rept. on Contract N171-21354A. Aug 61, 170p. 54 refs. Bureau of Naval Weapons rept. no. 7867.

DESCRIPTORS: Instrumentation, *Synchros, *Servo motors, *Tachometers, *Generators, *Failure (Mechanics), Design, Quality control, Production, Reliability, Manufacturing methods, *Precision equipment.

This report contains the results of an investigation of early failures of precision instrument components (synchros, resolvers, servo motors, and motor-tachometers). The investigation included disassembly and analysis of failed units, visits to major users and manufacturers, and a research and testing program. This report contains a summary of all the findings of this study. It also presents conclusions and recommendations with regard to the design, manufacture, quality control, and application of these components from the viewpoint of reducing the incidence of early failures. (Author)

SRIA-31 $4.00

Stanford Research Inst., Menlo Park, Calif.
HIGH TEMPERATURE HEAT UTILIZATION IN INDUSTRY, by F. Alan Ferguson, Leland H. Towle, and Richard R. Tarrice. Rept. on Contract AT(04-3)-115. Apr 61, 329p.

MATERIALS

APAE-82 $3.60

Alco Products, Inc., Schenectady, N. Y.
EVALUATION OF KANIGEN, ELECTROLESS NICKEL PLATING FOR STEAM SIDE OF A SODIUM COMPONENT STEAM GENERATOR. Rept. on Contract AT(11-1)-666. Feb 61, 46p.

ORNL-3130 $1.50

Oak Ridge National Lab., Tenn.
BARYTES CONCRETE FOR RADIATION SHIELDING: MIX CRITERIA AND ATTENUATION CHARACTERISTICS, by W. J. Grantham, Jr. Rept. on Contract W-7405-eng-26. 56p.

AD-255 813 $4.60

RCA Service Co., Inc., Patrick AFB, Fla.
RESULTS IN GEODETIC PHOTOGRAMMETRY II. A STUDY OF THE FEASIBILITY OF A PHOTOGRAMMATIC SURVEY OF AMR TO AN ACCURACY OF 1 PART PER MILLION, by Duane C. Brown. Rept. on Subcontract AF 08(606)3413. 15 Sep 60, 45p. RCA data processing technical rept. no. 65; AFMTC TR-61-2.

This report released by the cognizant military agency for sale to the public 13 Oct 61.

DESCRIPTORS: *Mapping, *Radar tracking, *Aerial photography, Photographic analysis, Photography, Tracking, Geodetic data, Position finding, Ballistic cameras.

For the survey of the final MISTRAM system it will be necessary to develop a camera of at least 1200 mm focal length and at least 300 mm aperture and having a field of view of nominally 10 x 10 degrees. The foremost consideration in the design of the camera should be its intended application in extensive photogrammetric flare triangulation. In order to insure that it be possible to achieve an effective directional accuracy per plate of 1 part in 10 to the sixth power through the averaging of multiple flashes, the basic criterion for the evaluation of metric performance is necessarily that the bias introduced by the system, and in particular the camera, should not exceed the equivalent of one micron on the plate. This capability can be tested under a variety of conditions by a special series of stellar exposures. The camera and systems design to be sought is the simplest which will provide the required metric and operational performance. (Author)

Ceramics and Refractories

AGC-1777 $3.60

Aerojet-General Corp., Azusa, Calif.
MODULUS OF RUPTURE MEASUREMENTS ON BERYLLIUM OXIDE AT ELEVATED TEMPERATURES, by Melvin L. Stehsel, Robert M. Hale, and Cecil E. Waller. Final rept. 15 June 59-15 Feb 60. Mar 60, 36p.

BMI-1530 $0.75

Battelle Memorial Inst., Columbus, Ohio.
THE COMPATIBILITY OF GAS COOLANTS AND CERAMIC MATERIALS IN COATED-PARTICLE NUCLEAR FUELS, by Arthur Levy and John F. Foster. Rept. on Contract W-7405-eng-92. July 61, 31p.

ORO-400 $2.00

Carborundum Co., Niagara Falls, N. Y.
SYNTHESIS AND FABRICATION OF REFRACTORY URANIUM COMPOUNDS, by K. M. Taylor and C. H. McMurtry. Summary rept. May 59-Dec 60, on Contract AT(40-1)-2558. Feb 61, 94p.

GEMP-3A $1.00

General Electric Co., Cincinnati, Ohio.
HIGH TEMPERATURE MATERIALS PROGRAM. Progress rept. no. 3, Part A, 1 July 61-31 Aug 61, on Contract AT(40-1)-2847. Sep 61, 37p.

ORNL-3168 $0.50

Oak Ridge National Lab., Tenn.
A MODEL FOR FISSION-GAS RELEASE FROM POROUS FUELS IN LOW-PERMEABILITY CONTAINERS, by John W. Prados. Rept. on Contract W-7405-eng-26. 11p.

Fuels, Lubricants, and Hydraulic Fluids

PB 157 623 $8.10

James Forrestal Research Center, Princeton, N. J.
PROJECT SQUID. A COOPERATIVE PROGRAM OF FUNDAMENTAL RESEARCH AS RELATED TO JET PROPULSION. Semi-annual progress rept. 1 Apr-30 Sep 60, on Contract Nonr-1858(25). 1 Oct 60, 90p. 55 refs. AD-245 819.

DESCRIPTORS: *Fluid mechanics, *Heat transfer, *Chemical reactions, *Combustion; Magnetohydrodynamics, Liquid rocket propellants, Solid rocket propellants, *Jet propulsion, Gas flow, Theory, Gases, Turbulent flow, Liquids, Flames, Free radicals, Ionization.

PB 181 038 $0.50

Williams, Clyde, and Co., Columbus, Ohio.
IMPROVED SILICONE LUBRICANTS FOR SERVICE ABOVE 400°F. Rept. on Contract CC 4569. [1961] 11p. 24 refs.

DESCRIPTORS: *Silicones, *Lubricants, *Hydraulic fluids, High temperature research, Stabilization, Oxidation.

The highlights of a Naval Research Laboratory study on "The Stabilization of Silicone Liquids Above 200°C, Part 2" (PB 161 449) are given, together with a discussion of the background and the outlook for silicone liquids as lubricants and hydraulic fluids.

MATHEMATICS

APAE Memo. no. 289 $8.60

Alco Products, Inc., Schenectady, N. Y.
BOBCAT CODE PREPARATION ANALYSIS ON THE IBM-650, by P. E. Bobe and R. L. Caton. Rept. on Contract AT(30-1)-2639. Aug 61, 98p.

WAPD-T-1231 $1.60

Bettis Atomic Power Lab., Pittsburgh, Pa.
SOLUTION OF THE TRANSPORT EQUATION BY THE METHOD OF POLYNOMIAL EXPANSION: PART I, by B. D. O'Reilly. Rept. on Contract AT(11-1)-GEN-14. Sep 60, 15p.

WAPD-T-1232 $1.60

Bettis Atomic Power Lab., Pittsburgh, Pa.
SOLUTION OF THE TRANSPORT EQUATION BY THE METHOD OF POLYNOMIAL EXPANSIONS: II, by D. C. Anderson. Rept. on Contract AT(11-1)-GEN-14. 29 Sep 60, 11p.

BNL-647(T-206) $0.50

Brookhaven National Lab., Upton, N. Y.
AN IBM 704 MONTE CARLO CODE TO CALCULATE FAST FISSION EFFECTS IN HOMOGENEOUS AND HETEROGENEOUS SYSTEMS, by H. Rief. Jan 61, 21p.

KAPL-M-DIG-TD-11 $7.60

Knolls Atomic Power Lab., Schenectady, N.Y.
FLOPSY I, by M. Phillips. Rept. on Contract W-31-109-eng-52. Apr 60, 68p.

UCRL-9476 $0.50

Lawrence Radiation Lab., U. of California, Berkeley.
AUTOMATIC DATA PROCESSING: PARTIAL PROCEEDINGS OF AN INFORMAL MEETING HELD SEPTEMBER 15, 1960 AT LAWRENCE RADIATION LABORATORY, ed. by Paul V. C. Hough and John L. Brown. Rept. on Contract W-7405-eng-48. Nov 60, 20p.

UCRL-5206-T $2.60

Lawrence Radiation Lab., U. of California, Livermore.
"SHARP", A ONE-DIMENSIONAL HYDRODYNAMICS CODE FOR THE IBM-704, by Olen Nance, Mark Wilkins and others. Rept. on Contract W-7405-eng-48. Apr 58, 22p.

AD-260 745 $3.60

Massachusetts Inst. of Tech., Cambridge.
ON MAXIMAL INITIAL SOLUTIONS OF THE CAUCHY INITIAL VALUE PROBLEM (FOR INTEGRAL MANIFOLDS OF NON-INVOLUTIVE DISTRIBUTIONS), by Peter L. Dombrowski. Rept. on Contract AF 49(638)42. June 61, 34p. 7 refs. AFOSR-888.

DESCRIPTORS: *Partial differential equations, *Algebraic topology, Topology.

Portions of this report will not reproduce well.

This analysis is mainly concerned with the problem of determining integral manifolds of non-involute distribution on manifolds, more precisely how to obtain by the methods of Cauchy characteristics from a given initial, low dimensional integral manifold a higher dimensional integral manifold, which includes the initial one, and the main objective is to investigate under which conditions one may get by this procedure a maximum integral manifold. (Author)

AD-261 013 repriced $0.75

Naval Ordnance Lab., White Oak, Md.
ON A MEAN VALUE THEOREM OF THE DIFFERENTIAL CALCULUS OF VECTOR VALUED FUNCTIONS, AND UNIQUENESS THEOREMS FOR ORDINARY DIFFERENTIAL EQUATIONS IN A LINEAR NORMED SPACE, by A. K. Aziz and J. B. Diaz. 16 May 61, 27p. 20 refs. Mathematics Dept. rept. no. M-17; NOLTR 61-22.

DESCRIPTORS: *Vector analysis, *Differential equations, Calculus of variations, Functions, Real variables, Sequences, *Functional analysis.

Suppose that: (1) the vector valued function x(t) is defined for all real t such that $a \leq t \leq b$, where $a < b$, and that its values are in a linear normed vector space B (the norm in B will be denoted by $\| \ \|$); (2) $\lim_{t \to a} x(t) = x(a)$ and $\lim_{t \to b} x(t) = x(b)$ (i.e., for example $\lim_{t \to a} \| x(t) - x(a) \| = 0$); (3) the derivative $x'(t)$ exists, and is finite, whenever $a < t < b$ (i.e., there is a vector $x'(t)$ in the space B such that $\lim_{s \to t} \| (x(s) - s(t))/(s-t) - x'(t) \| = 0$. Then there is a number τ, with $a < \tau < b$, such that $\| (x(b)-x(a))/(b-a) \| \leq \| x'(\tau) \|$. This mean value theorem for vector valued functions is proved first, and then it is used to derive uniqueness theorems for the (vector) initial value problem $\frac{dx}{dt} = f(t, x)$; $s(t_0) = x_0$. (Author)

AD-260 507 $1.60

Northwestern U. [Evanston, Ill.]
AN EXTENSION OF THE FUNCTIONAL EQUATION OF SKITOVICH CHARACTERIZING THE MULTIVARIATE NORMAL DISTRIBUTION, by S. G. Ghurye and Ingram Olkin, U. of Minnesota. Rept. on Contract AF 49(638)877. 21 July 61, 12p. 4 refs. AFOSR-901.

DESCRIPTORS: *Statistical distributions, Equations, Matrix algebra, Polynomials.

Portions of this report will not reproduce well.

Let $X_1, X_2, \ldots, X_n$ be independent, p-dimensional random vectors and let there exist non-singular p x p matrices $A_1, \ldots, A_n, B_1, \ldots, B_n$, such that the random vectors $A_1X_1 + \ldots + A_nX_n$ and $B_1X_1 + \ldots + B_nX_n$ are stochastically independent. Then the X_i are normally distributed. This result is proved by discussing the following functional equation:

$$\prod_{1 \le i \le n} f_i(t + C_i u) = A(t \mid u) + B(u \mid t),$$

where t, u are p-dimensional vectors, the C_i are non-singular matrices and $A(x \mid y)$, $B(x \mid y)$ are polynomials in x, for each fixed p-vector y.

CF-61-8-92 $1.60

Oak Ridge National Lab., Tenn.
LT-1, A GENERAL REACTOR LIFETIME PROGRAM FOR THE IBM-7090, by C. A. Preskitt and R. S. Carlsmith. Aug 61, 19p.

ORNL-3150 $0.75

Oak Ridge National Lab., Tenn.
WHIRLAWAY - A THREE-DIMENSIONAL, TWO-GROUP NEUTRON DIFFUSION CODE FOR THE IBM 7090 COMPUTER, by T. B. Fowler and M. L. Tobias. Rept. on Contract W-7405-eng-26. 27p.

SCR-428 $2.50

Sandia Corp., Albuquerque, N. Mex.
RANDOM PERMUTATIONS OF SELECTED POWERS OF 2 AND 3, by H. E. Anderson. Aug 61, 129p.

Computing Devices

NAA-SR-5211 $1.25

Atomics International, Canoga Park, Calif.
COOLANT FLOW AND OUTLET TEMPERATURE COMPUTER-MONITORS FOR THE HALLAM NUCLEAR POWER FACILITY PLANT PROTECTIVE SYSTEM, by H. Schlein. Rept. on Contract AT(11-1)-GEN-8. Sep 61, 46p.

WAPD-TM-278 $2.00

Bettis Atomic Power Lab., Pittsburgh, Pa.
DART - A DIGITAL-ANALOG SYSTEM FOR COMPUTING REACTOR START-UP TRANSIENTS, by W. G. Clarke. Rept. on Contract AT-11-1-GEN-14. Aug 61, 78p.

PB 158 425 $12.50

California U., Los Angeles.
INVESTIGATIONS IN DIGITAL TECHNOLOGY RESEARCH, by G. Estrin, C. T. Leondes and others. Annual summary rept. 1 June 59-31 May 60, on Contract Nonr-233(52). Nov 60, 175p. 51 refs. Dept. of Engineering rept. no. 60-82; AD-251 330.

DESCRIPTORS: *Digital computers, Number theory, Switching circuits, Magnetic cores, Digital systems, Control systems, Magnetostriction, Ferrites, Heating, Magnetic properties, Algebra, Piezoelectric materials, Thin films.

Studies relating to a new computer system called the Fixed-Plus-Variable Computer are reviewed. Properties of one or more modern machines were studied and the operations of each machine were compared with the IBM 709 - 7090. Some work was done on description of the complete order lists in a common language. Significant analytical work was carried out in related areas of studies of unconventional arithmetic and studies of adaptive control systems with emphasis on dynamic programming formulation. Temperature measurements of ferromagnetic memory elements, development of thin film deposition equipment, studies of coupling between piezoelectric and magnetostrictive phenomena, and initiation of the design and measurement of high speed switching circuits are reported. (Author)

TID-13664 $5.60

Computer Lab., U. of Illinois, Urbana.
TECHNICAL PROGRESS REPORT ON CONTRACT AT(11-1)-415. April 61, 54p.

HW-68100 $1.25

Hanford Atomic Products Operation, Richland, Wash.
MELEAGER - A BURN-UP CODE FOR FUEL CYCLE ANALYSIS, by J. R. Triplett and G. J. Busselman. Rept. on Contract AT(45-1)-1350. Mar 61, 46p.

PB 147 035 $3.60

Intelligent Machines Research Corp., Alexandria, Va.
PRINT READER MX2021( )/6 IMR ANALYZING READER MODEL 8PT1. Interim engineering rept. no. 5, 1 Oct-31 Dec 58, on Contract AF 30(602)1758. [1959] 34p. RADC-TN-59-84; AD-211 432.

DESCRIPTORS: *Reading machines, *Machine translation, Programming, Design, Errors, *Data processing systems.

Programming was brought far enough to permit the machine to read 25 capital letters and 10 numerals. Portions of the machine previously designed and checked out independently were debugged and made to work in the system. A breadboard model of the transistorized machine was made to read and punch out 10 numerals.

AD-260 494 $8.10

Lincoln Lab., Mass. Inst. of Tech., Lexington.
RELIABILITY OF REDUNDANT COMPUTERS, by Rein Teoste. Rept. on Contract AF 19(604)7400. 22 Mar 61, 83p. 9 refs. 21G-0029.

DESCRIPTORS: *Computers, Reliability, Test methods, *Circuits, Design, Mathematical analysis, *Failure (Mechanics), *Digital computers, Probability, Coding, Miniature electronic equipment, Mathematical analysis.

It has been said that the only solution to the reliability problem of complex electronic computing equipment is redundancy. This report investigates the methods of component redundancy. Four methods are discussed: majority redundancy, Moore-Shannon redundancy, gate connector redundancy and quadded circuitry. Also a modified version of majority redundancy is investigated. Equations for calculating system reliability are derived and evaluated for these methods. The results show that reliability improvement of redundant systems depends greatly on the complexity of the system. The mean time to failure cannot be increased by very much, unless the computer is quite complex. Calculations indicate that the combination of Moore-Shannon redundancy and gate connector redundancy will yield the best reliability improvement. (Author)

MECHANICS

AD-260 004 $1.60

National Research Labs., Ottawa (Canada).
OPTIMUM LENGTH AND THICKNESS OF PROPELLER BLADE SECTIONS FROM CAVITATION AND STRENGTH CONSIDERATIONS, by S. T. Mathews and J. S. C. Straszak. Apr 61, 19p. 3 refs. Mechanical engineering rept. MB-231.

DESCRIPTORS: Propeller blades, *Hydrodynamics, Cavitation, Design, Mathematical analysis, Algebra, Stresses, *Marine propellers, Canada.

This report gives a method by means of which NACA type 16 principal section dimensions, at any radius of blade, can be obtained, to satisfy simultaneously the strength and the cavitation requirements for a conventional screw propeller. (Author)

SCTM-142-61(71) $1.00

Sandia Corp., Albuquerque, N. Mex.
FLEXURAL CHARACTERISTICS OF RADIALLY LOADED CYLINDRICAL SHELLS WITH STIFFENING RINGS, by D. R. Fisher. Aug 61, 29p.

Aerodynamics and Pneumatics

PB 158 362 $2.60

Naval Ordnance Lab., White Oak, Md.
SOME CONSIDERATIONS OF THE LAMINAR STABILITY OF INCOMPRESSIBLE TIME-DEPENDENT BASIC FLOWS, by S. F. Shen. 18 Sep 59, 24p. 6 refs. Aerodynamics Research rept. 61, NAVORD rept. 6654; AD-239 806.

DESCRIPTORS: *Gas flow, *Stability, *Laminar boundary layer, Acceleration, Theory.

The concept of "momentary stability" is propsoed as a stability criterion for infinitesimal disturbances in a time-dependent basic flow, and is said to exist when the ratio of kinetic energy of the disturbances to the kinetic energy of the basic flow tends to decrease instantaneously. Stability phenomena for unsteady basic flows are analyzed for the case of the inviscid limit. For finite Reynolds numbers it is shown that stability calculations based on instantaneous profiles are valid only for extremely small accelerations or decelerations, and generally the neutral curve so obtained has little significance. In general, flows are greatly stabilized by acceleration and greatly destabilized by deceleration.

AD-255 078 $4.60

RCA Service Co., Inc., Patrick AFB, Fla.
PERTURBATIONAL CONSTRUCTION OF RE-ENTRY TRAJECTORIES FOR IMPACT PREDICTION AND RADAR ACQUISITION, by Raul R. Hunziker. 15 Oct 60, 46p. Systems analysis technical rept. no. 13; AFMTC TR-61-3.

This report released by the cognizant military agency for sale to the public 13 Oct 61.

DESCRIPTORS: *Re-entry aerodynamics, *Atmosphere entry, Perturbation theory, Differential equations, Numerical analysis, *Flight paths, Guided missile trajectories, Satellite vehicle trajectories, Mathematical prediction, Radar, Detection.

Re-entry trajectories are constructed using a special perturbation procedure based on PICARD's method of successive substitutions by departing from a zero order or reference path. The reference path for the real time impact prediction case is a closed form rectilinear trajectory. For the high precision calculations of radar acquisition the zero order path is the planned path plus constant increments to match the radar observed re-entry initial conditions. Numerical constructions of the first order solutions for relatively large values of the perturbations in the initial conditions show that the end figure errors are sufficiently small. These procedures are conducive to the small total computing times which are essential for real time impact or sequential position prediction. (Author)

METALLURGY

NYO-9588 $2.60

Aeroprojects, Inc., West Chester, Pa.
APPLICATIONS OF ULTRASONIC ENERGY. DEVELOPMENT OF ULTRASONIC ROLL-BOND CLADDING FOR PLATE-TYPE FUEL ELEMENTS. Quarterly progress rept. no. 1, 1 Nov 60-1 Feb 61, on Contract AT(30-1)-1836. Feb 61, 29p.

ANL-6389 $0.50

Argonne National Lab., Ill.
DESIGN CRITERIA FOR STEEL IN NUCLEAR REACTORS, by S. H. Fistedis. Rept. on Contract W-31-109-eng-38. July 61, 19p.

ANL-6290 $0.50

Argonne National Lab., Ill.
PREPARATION OF ALLOY FOR FIRST CORE LOADING OF EBR-II, by Donald C. Hampson. Rept. on Contract W-31-109-eng-38. Aug 61, 17p.

TID-6506(Suppl.) $3.00

Atomic Energy Commission. Div. of Reactor Development, Washington, D. C.
SUMMARIES OF FUELS AND MATERIALS DEVELOPMENT PROGRAMS. Apr 61, 219p.

NAA-SR-6427 $0.50

Atomics International, Canoga Park, Calif.
OXYGEN DIFFUSION IN BERYLLIUM OXIDE, by S. B. Austerman, R. A. Meyer, and D. G. Swarthout. Rept. on Contract AT(11-1)-GEN-8. Sep 61, 24p.

NAA-SR-Memo-6396 $1.10

Atomics International, Canoga Park, Calif.
THE RELATION OF TRANSVERSE RUPTURE STRENGTH TO ULTIMATE TENSILE STRENGTH FOR ZR HYDRIDES, by J. W. Raymond. May 61, 5p.

NAA-SR-6034 $1.00

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THE SPECIFIC HEATS AND RESISTIVITIES OF MOLYBDENUM, TANTALUM, AND RHENIUM FROM LOW TO VERY HIGH TEMPERATURES, by R. E. Taylor and R. A. Finch. Rept. on Contract AT(11-1)-GEN-8. Sep 61, 36p.

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DEVELOPMENT OF COLD BONDING PROCESSES FOR THE CANDU REACTOR PROGRAM, by S. W. Porembka. Quarterly rept. no. 3, Sep 61, 15p.

BMI-1536 $1.75

Battelle Memorial Inst., Columbus, Ohio.
DEVELOPMENT OF NIOBIUM-URANIUM ALLOYS FOR ELEVATED-TEMPERATURE FUEL APPLICATIONS, by John A. DeMastry, Donald P. Moak and others. Rept. on Contract W-7405-eng-92. Aug 61, 65p.

WAPD-T-1228 $6.60

Bettis Atomic Power Lab., Pittsburgh, Pa.
PRESSURE-DEFLECTION AND FATIGUE PROPERTIES OF ZIRCALOY DIAPHRAMS, by E. F. Losco, R. Leggett and others. Rept. on Contract AT(11-1)-GEN-14. July 60, 63p.

PB 158 356 $7.60

Crucible Steel Co. of America, Pittsburgh, Pa.
DEVELOPMENT OF COATINGS FOR TITANIUM DURING MILL PROCESSING, by J. D. Klicker, W. H. Schaefer, Jr. and H. B. Bomberger. Final technical engineering rept. May 58-May 60, on Contract AF 33(600)37425. Nov 60, 80p. 50 refs. AMC Technical rept. 60-7-670; AD-252 849.

DESCRIPTORS: *Titanium alloys, Sheets, Rolling mills, Processing, Coatings, Manufacturing methods, *Ceramic coatings, Contamination, Effectiveness, Lubricants, Tensile properties, *Metal coatings, Aluminum coatings, Aluminum alloys, Hardness, Vanadium alloys, Molybdenum alloys, Aging, Oxidation, Oxidation inhibitors.

Three proprietary ceramic-type coatings to protect and reduce the contamination of aircraft and missile quality titanium alloy sheet during rolling mill processing were further developed and determined as satisfactory. These coatings are effective in air and in furnace atmospheres at temperatures up to 2000F for periods of four hours or more and act as lubricants during mill rolling. (Author)

TID-11692 $2.75

Dow Chemical Co., Midland, Mich.
THE DOW ALUMINUM PYROMETALLURGICAL PROCESS, by Robert J. Teitel and Gilbert S. Layne. Annual technical progress rept. 1960 on Contract AT(11-1)-768. Aug 60, 180p.

GA-2316 $1.60

General Atomic, San Diego, Calif.
MATHEMATICAL ANALYSIS OF WIRE DRAWING, by T. Trozera and J. E. Dorn. Rept. on Contract AT(04-3)-167. 28 July 61, 12p.

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General Atomic Div., General Dynamics Corp., San Diego, Calif.
METALLOGRAPHY OF CARBIDE FUEL COMPOUNDS, by G. B. Engle. Rept. on Contract AT(04-3)-314. Mar 61, 26p.

60-GC-138 $1.60

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SINTERING BEHAVIOR OF BERYLLIUM OXIDE, by E. J. Felten. Oct 60, 15p.

HW-67715 $1.75

Hanford Atomic Products Operation, Richland, Wash.
EVALUATION OF IRON- AND NICKEL-BASE ALLOYS FOR MEDIUM AND HIGH TEMPERATURE REACTOR APPLICATIONS. PART I, by H. J. Pessl. Rept. on Contract AT(45-1)-1350. Feb 61, 64p.

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Hanford Atomic Products Operation, Richland, Wash.
OBSERVATIONS ON THE MICROSTRUCTURE OF PLUTONIUM, by R. D. Nelson and H. R. Gardner. Rept. on Contract AT(45-1)-1350. Mar 61, 16p.

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ELEVATED TEMPERATURE IMPACT DENSIFICATION OF Mo-UO_2 POWDER MIXTURES, by D. J. Murphy, R. S. Kirby and others. Rept. on Contract W-7405-eng-36. Sep 61, 39p.

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Los Alamos Scientific Lab., N. Mex.
HOT PRESSING OF LOW-MOLYBDENUM-URANIUM ALLOYS, by G. S. Hanks and L. S. Levinson. Rept. on Contract W-7405-eng-36. Sep 61, 32p.

NLCO-831 $1.00

National Lead Co., Cincinnati, Ohio.
EFFECTS OF FURNACE PRESSURE AND FEED MATERIAL ON URANIUM INGOT QUALITY, by Henry M. Eikenberry, Robert B. Steck, and Donald DeTru. Rept. on Contract AT(30-1)-1156. Aug 61, 45p.

AD-261 188 $4.60

Naval Weapons Lab., Dahlgren, Va.
THE EFFECT OF REDUCED LENGTH OF CENTRAL NOTCH IN THE G_c TEST ON FRACTURE TOUGHNESS AND SLOW CRACK GROWTH IN TITANIUM ALLOYS Ti-6Al-4V AND Ti-13V-11Cr-3Al WITH STATISTICAL INTERPRETATION. TESTS ON SHEET STOCK WITH A YIELD-STRENGTH TO DENSITY RATIO OF ONE MILLION REPRESENTING MATERIAL BEING CONSIDERED FOR SOLID-PROPELLANT ROCKET CASINGS, by H. E. Romine and Klaus Abt. 28 July 61, 48p. 4 refs. NWL rept. no. 1766.

DESCRIPTORS: *Titanium alloys, *Sheets, *Rocket cases, Rocket motors, Solid rocket propelllants, Fracture (Mechanics), Statistical analysis, Aluminum alloys Chromium alloys, Vanadium alloys, Materials, Alloys.

The effects of reduced length of central notch on fracture toughness G_c* and slow crack growth ($a-a_o$) were investigated in sheet samples of two titanium alloys Ti-6Al-4V and Ti-13V-11Cr-3Al. The G_c* value was not greatly affected by reduced slot length. Slow crack growth ($a-a_o$) was fairly constant for the larger notches but decreased with the smaller notches. The two alloys were compared for quality on the usual basis of crack length tolerance after slow growth.

NMI-1243 $1.00

Nuclear Metals, Inc., Concord, Mass.
DEFORMATION MODES OF ZIRCONIUM AT 77°K, 300°K, 575°K, and 1075°K, by E. J. Rapperport and C. S. Hartley. Rept. on Contract AT(30-1)-1565. Oct 60, 38p.

ORNL-3160 $3.00

Oak Ridge National Lab., Tenn.
METALLURGY DIVISION. Annual progress rept. for period ending 31 May 61 on Contract W-7405-eng-26. 207p.

TID-7614 $1.50

Office of Technical Information, Atomic Energy Commission, Washington, D. C.
URANIUM CARBIDES AS REACTOR FUEL MATERIALS. Proceedings of the symposium held at Atomic Energy Commission, Germantown, Maryland, 4 Apr 61. 154 p.

AD-260 074 $1.10

Ohio State U. Research Foundation, Columbus.
FLOATING ZONE REFINING OF BORON USING ELECTRON BEAM MELTING, by M. O. Thurston and C.B. Hood. Rept. on Contract AF 49(638)424. May 61, 9p. 6 refs. RF Proj. 829; AFOSR-TN-60-791.

DESCRIPTORS: *Boron, Purification, Preparation, Boron compounds, Chlorides, Reduction, Zone melting, Electron bombardment, Electron beams, Hydrogen, Electrical properties, Resistance, Rods.

Boron rods, prepared by the reduction of boron trichloride with hydrogen, were refined by the floating zone process. The melting was accomplished by electron bombardment, using a 3000 volt, 0.2 ampere beam. The band gap for a zone refined sample after three passes was 1.30 ev as determined from resistivity measurements. It was observed that carbon is an electrically active impurity, and that nickel and tungsten are not. (Author)

DP-606 $0.50

Savannah River Lab., Aiken, S. C.
ELECTRON METALLOGRAPHY OF AN IRRADIATED STAINLESS STEEL NOZZLE, by C. L. Angerman. Rept. on Contract AT(07-2)-1. Aug 61, 20p.

ORO-366 $2.00

Union Carbide Metals Co., Niagara Falls, N. Y.
COLUMBIUM ALLOY CLAD URANIUM CARBIDE FUEL ELEMENT, by J. J. Finley, M. Korchynsky, and S. Sarian. Rept. on Contract AT(40-1)-2559. Sep 60, 90p.

CVNA-92 $5.60

Westinghouse Electric Corp., Pittsburgh, Pa.
EVALUATION OF ZIRCALOY-2 UNIFORM WALL AND FINNED TUBING FOR CVTR FUEL ELEMENT FABRICATION. Sub-Task 6.01: FUEL ELEMENT CLADDING AND METAL JOINING OF FUEL ASSEMBLIES, by E. S. Foster and P. P. King. Terminal rept. on Contract AT(30-1)-2289. 26 July 61, 51p.

HW-68738 $1.60

Hanford Atomic Products Operation, Richland, Wash.
CORROSION OF VARIOUS METALS AND ALLOYS BY PHOSGENE, HYDROGEN CHLORIDE, AND CARBON TETRACHLORIDE AT 400 - 600C, by W. L. Walker. Apr 61, 14p.

HW-67818(Rev.) $2.60

Hanford Atomic Products Operation, Richland, Wash.
MULTIPLE RATE TRANSITIONS IN THE AQUEOUS CORROSION OF ZIRCALOY, by B. Griggs, H. P. Maffei, and D. W. Shannon. Rept. on Contract AT(45-1)-1350. Dec 60, 24p.

CF-61-2-95 $3.60

Oak Ridge National Lab., Tenn.
HRT CORROSION SAMPLES - ADDITIONAL DATA ON SPECIMENS REMOVED PRIOR TO RUN NO. 20, by J. E. Baker, M. D. Silverman and others. Feb 61, 36p

IDO-14554 $0.50

Phillips Petroleum Co., Idaho Falls.
CORROSION TESTS IN MOLTEN LEAD-LEAD CHLORIDE, by N. D. Stalica, G. S. Adams and M. R. Bomar. Rept. on Contract AT(10-1)-205. June 61, 21p.

NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

BMI-1543 $0.75

Battelle Memorial Inst., Columbus, Ohio.
RADIATION-INDUCED GRAFT-POLYMERIZATION STUDIES, by Francis A. Sliemers, Jr., John F Kircher and others. Topical rept. on Contract W-7405-eng-92. Sep 61, 27p.

BNL-659(S-57) $1.75

Brookhaven National Lab., Upton, N. Y.
NUCLEAR ENGINEERING DEPARTMENT. Progress rept. 1 Sep-31 Dec 60. May 61, 68p.

TID-13125 $1.60

Case Inst. of Tech., Cleveland, Ohio.
NEUTRINO PHYSICS AND COSMIC RAYS. Progress rept. on Contract AT(11-1)-818. July 61, 14p.

CU(PNPL)-206 $5.60

Columbia U., N. Y.
PEGRAM NUCLEAR PHYSICS LABORATORIES. Progress rept. for July-Sep 60 on Contract AT(30-1)-GEN-72. 54p.

DP-635 $1.00

du Pont de Nemours, E. I., and Co., Wilmington, Del.
HEAVY WATER MODERATED POWER REACTORS, comp. by L. Isakoff. Progress rept. for June 61 on Contract AT(07-2)-1 Aug 61, 44p.

GA-2151 $1.00

General Atomic Div., General Dynamics Corp., San Diego, Calif.
MARITIME GAS-COOLED REACTOR PROGRAM: SUGGESTED VALUES FOR THE PARTIAL CROSS SECTIONS OF U^{235} FOR USE IN THE NEUTRONIC ANALYSIS OF THERMAL AND INTERMEDIATE REACTORS, by A. J. Goodjohn and N. F. Wikner. Rept. on Contract AT(04-3)-187. July 61, 46p.

TID-13352 $1.60

Illinois U., Urbana.
STUDIES IN RADIATION CHEMISTRY AND CHEMICAL KINETICS (KUPPERMANN). Rept. on Contract AT(11-1)-691. 10 Aug 61, 16p.

KAPL-2151 $1.00

Knolls Atomic Power Lab., Schenectady, N. Y.
VARIATIONAL METHOD IN THE CALCULATION OF REACTOR NEUTRON FLUX DENSITY, by Frank D. Judge. Rept. on Contract W-31-109-eng-52. Feb 61, 37p.

UCRL-5882(Rev.) $0.75

Lawrence Radiation Lab., U. of California, Livermore.
CHEMICAL REACTIONS INDUCED BY UNDERGROUND NUCLEAR EXPLOSIONS, by G. H. Higgins, D. E. Rawson, and W. Z. Wade. Rept. on Contract W-7405-eng-48. June 61, 31p.

UCRL-6377 $8.10

Lawrence Radiation Lab., U. of California, Livermore.
CRITICAL CONDITIONS FOR SELF-SUSTAINING REACTIONS IN THE MIRROR MACHINE, by Richard F. Post. Rept. on Contract W-7405-eng-48. June 61, 84p.

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NUCLEAR MAGNETIC RESONANCE STUDIES, PART I: H^1 TEMPERATURE-DEPENDENT CHEMICAL SHIFTS. PART II: F^{19} SPIN-SPIN COUPLINGS, by Leonidas Petrakis. Rept. on Contract W-7405-eng-48. June 61, 87p.

UCRL-6470 $1.00

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PROTON CAPTURE GAMMA RAYS FROM Si^{28} IN THE REGION OF THE PHOTONUCLEAR GIANT RESONANCE, by Calvin C. Gardner. Rept. on Contract W-7405-eng-48. May 61, 44p.

UCRL-9753 $2.75

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THEORY OF ODD-MASS ELLIPSOIDAL NUCLEI, by Lucy Wu Person. Rept. on Contract W-7405-eng-48. July 61, 163p.

UCRL-9806 $1.75

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TRACER STUDIES IN HYDROGEN-ADAPTED SCENEDESMUS USING ^{3}H AND ^{14}C, by Richard A. Goldsby. Rept. on Contract W-7405-eng-48. Aug 61, 74p.

CF-61-7-20 $1.60

Oak Ridge National Lab., Tenn.
THE RELATIVISTIC DOPPLER PROBLEM, by C. D. Zerby, R. B. Curtis, and H. W. Bertini. 12 July 61, 18p.

PB 157 366 $10.10

Minnesota U. School of Physics, Minneapolis.
PRIMARY AND SECONDARY COSMIC RADIATION NEAR THE GEOMAGNETIC EQUATOR, by Laurence E. Peterson. Rept. on Cosmic Ray Program, Contract Nonr-710(19). Oct 60, 122p. 41 refs. Technical rept. no. CR-30; AD-249 481.

DESCRIPTORS: *Cosmic rays, Atmosphere, Measurement, *Cosmic ray telescopes, Balloons, *Alpha particles, Density, Pacific Ocean, *Cerenkov radiation, *Scintillation counters

In order to determine the azimuthal effects of primary cosmic ray protons and alpha particles near the geomagnetic equator, a large cosmic ray telescope at a 60 degree zenith angle was flown on a high altitude balloon near Guam. The telescope was provided with a Cerenkov detector and a scintillation counter in order to resolve events caused by various primary and secondary cosmic rays. Although alpha particles were not well enough resolved to provide a flux measurement, the exponent of a power law integral number-energy spectrum could be obtained from the East-West asymmetries and geomagnetic theory. The spectrum exponent was at least as large as 1.2. The secondary splash albedo flux was measured to be 20 + or - 5 particles/sq m-steradian-sec, and the flux of slow protons in the energy range 160-600 Mev was found to be 27 + or - 5 particles/sq m-steradian-sec at a balloon depth of 11.5 gm/sq cm and a 60 degree zenith angle. A residual slow proton flux of 15 + or - 6 particles/sq m-steradian-sec at zero depth was observed. The secondary albedo and slow proton fluxes were observed to have a small tendency to peak in the East-West plane. (Author)

NYO-9419 $1.10

Radiation Applications, Inc., Long Island City, N. Y.
A COMPARISON OF RADIATION-INDUCED GRAFT COPOLYMERIZATION UTILIZING ELECTRON ACCELERATORS AND ISOTOPE SOURCES AS RADIATION INITIATORS, by George Odian, William F. Oliver, and Earl Pierre. Rept. on Contract AT(30-1)-2636. 12 Sep 61, 9p.

NYO-9829 $3.60

Radiation Applications Inc., Long Island City, N. Y.
A STUDY OF THE MECHANISM OF RADIATION-INDUCED GELATION IN MONOMER-POLYMER MIXTURES, by George Odian, Bruce S. Bernstein, and James J. Kelly. Quarterly summary rept. 1 May-31 July 61 on Contract AT(30-1)-2816. Aug 61, 35p.

DP-608 $1.25

Savannah River Lab., Aiken, S. C.
A STUDY OF THERMAL AND RESONANCE NEUTRON FLUX DETECTORS, by George M. Jacks. Rept. on Contract AT(07-2)-1. Aug 61, 50p.

RWD-RLM-236 $6.60

Thompson Ramo Wooldridge, Inc., Canoga Park, Calif.
KINETIC STUDIES OF HETEROGENEOUS WATER REACTORS. Quarterly progress rept. no. 24, July-Sep 60 on Contract AT(04-3)-165. Feb 61, 77p. RW-C52-OU49.

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PION PRODUCTION IN 300 GEV NUCLEON-NUCLEON COLLISIONS, by Keith R. Watson and Denis Hankins. Rept. on Contract AT(11-1)-68. 5 June 61, 13p.

Instruments and Installations

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Aerojet-General Nucleonics, San Ramon, Calif.
CENTRIFUGAL CREEP TEST MACHINE EVALUATION PROGRAM. Final rept. on Contract AT(04-3)-251. Dec 60, 130p.

BNL-5493 $1.60

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A HIGH RESOLUTION DIFFERENTIAL CERENKOV COUNTER, by Thaddeus F. Kycia and Edgar W. Jenkins. 15p.

APEX-747 $0.50

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D14OE-1 CONTROL NUCLEAR SENSORS, by R. L. Treinen. Rept. on Contracts AF 33(600)-38062 and AT(11-1)-171. July 61, 24p.

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THE DEVELOPMENT OF A BETA-RAY PARTICLE SIZE ANALYZER, by Seymour Z. Lewin, Jane Connor Sheridan, and Eric J. Hewitt. Final rept. on Contract AT(30-1)-2372. July 61, 107p.

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PWAC-339 $2.00

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DEVELOPMENT OF HIGH TEMPERATURE SENSORS, Rept. 1 July 59-30 Apr 61, on Contract AT(11-1)-229. June 61, 91p.

TID-13123 $3.60

Purdue Research Foundation, Lafayette, Ind.
BASIC RESEARCH WITH HIGH ENERGY ELECTRONS AND X-RAYS PRODUCED BY A 300 MEV SYNCHROTRON. Annual progress rept. on Contract AT(11-1)-123, Task A. June 61, 33p.

WT-1737 $1.00

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TID-13417 $4.60

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LINEAR ELECTRON ACCELERATOR STUDIES AND PROPOSED TWO-MILE ACCELERATOR PROJECT. Combined status rept. on Contracts AT(04-3)-21 and AT(04-3)-363. July 61, 45p. M. L. rept. no. 827; M rept. no. 272.

CTSL-16 $2.60

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MAGNET POSITIONING PROBLEMS FOR A 300 GEV PROTON SYNCHROTRON, by Robert I. Hulsizer. Rept. on Contract AT(11-1)-68. 12p. 20 Oct 61.

CTSL-12 $1.60

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PRELIMINARY COST ESTIMATE FOR A 300 GEV CASCADE SYNCHROTRON, by M. H. Blewett. Rept. on Contract AT(11-1)-68. 20 Oct 60, 11p.

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A PROTON SYNCHROTRON FOR 300 GEV, by Matthew Sands. Rept. on Contract AT(11-1)-68. Sep 60, 29p.

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CTSL-15 $1.60

Synchrotron Lab., Calif. Inst. of Tech., Pasadena.
A RADIO FREQUENCY SYSTEM FOR A 300 GEV PROTON SYNCHROTRON, by Kenneth W. Robinson. Rept. on Contract AT(11-1)-68. 19 Jan 61, 13p.

CTSL-24 $2.60

Synchrotron Lab., Calif. Inst. of Tech., Pasadena.
VACUUM REQUIREMENTS FOR THE CASCADE SYNCHROTRON, by Vincent Z. Peterson. Rept. on Contract AT(11-1)-68. 11 Apr 61, 22p.

Y-1367 $0.50

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A DUAL PLATING CURRENT REGULATOR, by J. J. Henry. Rept. on Contract W-7405-eng-26. Sep 61, 13p.

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ATL-A-109(Rev. 1) $4.00

Advanced Tech. Labs., American-Standard, Mountain View, Calif.
TECHNICAL FEASIBILITY AND ECONOMIC POTENTIAL OF THE VARIABLE MODERATOR REACTOR. Final rept. on Contract AT(04-3)-250. Dec 60, 305p.

APAE-89 $13.50

Alco Products, Inc., Schenectady 1, N. Y.
SM-2 FULL SCALE FLOW STUDIES, by J. A. Christenson, W. M. S. Richards, and S. L. Davidson. Termination rept. on Contract AT(30-3)-326. 30 July 61, 198p.

ANL-6357 $2.00

Argonne National Lab., Ill.
CRITICAL EXPERIMENTS FOR THE PRELIMINARY DESIGN OF THE ARGONNE HIGH FLUX REACTOR, ed. by J. W. L. de Villiers. Rept. on Contract W-31-109-eng-38. June 61, 80p.

ANL-6401 $0.50

Argonne National Lab., Ill.
CRITICAL STUDIES OF A DILUTE CARBIDE FAST REACTOR CORE ZPR-III ASSEMBLY 34, by R. J. Huber, J. K. Long and others. Rept. on Contract W-31-109-eng-38. May 61, 21p.

ANL-6337 $0.50

Argonne National Lab., Ill.
CRITICAL STUDIES OF A DILUTE OXIDE FAST REACTOR CORE (ZPR-III ASSEMBLY 30), by P. I. Amundson, A. L. Hess, and others. Rept. on Contract W-31-109-eng-38. May 61, 24p.

ANL-6382 $0.75

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A DESCRIPTION OF INTEGRAL PHYSICS DATA FOR FAST REACTOR DESIGN, by W. B. Loewenstein and D. Meneghetti. Rept. on Contract W-31-109-eng-38. July 61, 29p.

ANL-6384 $0.50

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DEVELOPMENT OF A PROCESS FOR SODIUM BONDING OF EBR-II FUEL AND BLANKET ELEMENTS, by Edmund S. Sowa and Edward L. Kimont. Rept. on Contract W-31-109-eng-38. July 61, 22p.

ANL-6383 $1.75

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THE PHYSICS DESIGN OF THE EBR-II, by W. B. Loewenstein. Rept. on Contract W-31-109-eng-38. July 61, 70p.

ANL-6409 $1.75

Argonne National Lab., Ill.
REACTOR DEVELOPMENT PROGRAM. Progress rept. Aug 61 on Contract W-31-109-eng-38. Sep 61, 72p.

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BIBLIOGRAPHY ON METEORIC RADIO WAVE PROPAGATION, by Wilhelm Nupen. 29 May 61, 139p. 368 refs. National Bureau of Standards technical note no. 94.

DESCRIPTORS: *Radio waves, *Electromagnetic waves, Propagation, *Ionospheric propagation, *Meteors, Radio communication systems, *Bibliography

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ROOT LOCUS METHOD FOR PLOTTING HYSTERESIS LOOPS OF FERROMAGNETIC THIN FILMS, by Arthur A. Borsei. Rept. on Contract Nonr-233(52). Nov 60, 26p. 13 refs. Dept. of Engineering rept. no. 60-101; AD-250 151.

DESCRIPTORS: *Thin films, *Ferromagnetic materials, *Hysteresis, Numerical methods and procedures.

A graphical method is given to plot hysteresis loops of ferromagnetic thin films under given conditions of applied perpendicular field, stress and initial value of angle between the easy magnetization axis and the switching field. The method is based on a root locus technique used to extract the roots of a polynomial derived from the simple rotational model of magnetization. The root locus is readily obtained by means of a Spirule and any combination of parameters may be investigated. In particular, two dimensional stresses and isotropic stresses may be considered. Some interesting analogies between the locus and roots and a hysteresis loop may be made, such as real axis break-away points and coercive force, since at such points two real roots become complex and correspondingly, there is only one value of induction for a value of applied switching field. The accuracy obtained by use of the Spirule has been checked by a digital computer and is limited only by the graphical skill of the plotter. (Author)

UCRL-13019 $1.60

Colorado School of Mines Research Foundation, Inc., Golden.
STRESSES INDUCED IN A SEMI-INFINITE SOLID BY A CENTER OF COMPRESSION. Technical rept. July 61, 15p.

GA-2460 $1.10

General Atomic Div., General Dynamics Corp., San Diego, Calif.
EXTENDED TABLES FOR THE COMPUTATION OF THE VOLUME TERM OF THE RESONANCE INTEGRAL, by V. W. Nather and L. W. Nordheim. Rept. on Contract AT(04-3)-167. Aug 61, 9p.

GA-2527 $1.25

General Atomic Div., General Dynamics Corp., San Diego, Calif.
A PROGRAM OF RESEARCH AND CALCULATIONS OF RESONANCE ABSORPTION, by L. W. Nordheim. Final rept. on Contract AT(04-3)-167. Aug 61, 47p.

APEX-659 $0.75

General Electric Co., Cincinnati, Ohio.
THE ELASTIC-PLASTIC STRESSES WITHIN A TUBE GENERATING INTERNAL HEAT UNIFORMLY, by Bernard W. Shaffer. Rept. on Contracts AF 33(600)-38062 and AT(11-1)-171. Apr 61, 35p.

APEX-615 $1.25

General Electric Co., Cincinnati, Ohio.
INVESTIGATION OF A CORRUGATED SHELL AS AN ELASTIC SUPPORT OF A BUNDLE OF RODS, by Dr. J. H. Meier. Rept. on Contracts AF 33(600)-38062 and AT(11-1)-171. July 61, 54p.

HW-26873 $1.00

Hanford [Atomic Products Operation] Richland, Wash.
THERMOGALVANIC EFFECTS BETWEEN ALUMINUM SLUG JACKETS, by Y. B. Katayama. 2 Feb 53, 6p.

UCRL-9809 $0.50

Lawrence Radiation Lab., U. of California, Berkeley.
ELECTRON-TRACK COUNTING FOR BETA SPECTROSCOPY, by Kenneth D. Sevier. Rept. on Contract W-7405-eng-48. Aug 61, 11p.

UCRL-9752 $2.00

Lawrence Radiation Lab., U. of California, Berkeley.
HYPERON PRODUCTION BY K^- MESONS INCIDENT ON HYDROGEN, by William E. Humphrey. Rept. on Contract W-7405-eng-48. June 61, 92p.

UCRL-6385 $2.60

Lawrence Radiation Lab., U. of California, Livermore.
PARTICLE MOTION ON MAGNETIC FLUX SURFACES IN "STABILIZED" AND HARD-CORE PINCHES, by S. A. Colgate, H. P. Furth, and others. Rept. on Contract W-7405-eng-48. June 61, 26p.

UCRL-6535 $1.75

Lawrence Radiation Lab., U. of California, Livermore.
PROBES AND MAGNETIC PUMPING IN PLASMA, by Laurence S. Hall. Rept. on Contract W-7405-eng-48. July 61, 70p.

UCRL-6381(Addendum) $1.60

Lawrence Radiation Lab., U. of California, Livermore.
PRODUCTION AND CONTAINMENT OF HOT DEUTERIUM PLASMAS IN MULTISTAGE MAGNETIC COMPRESSION EXPERIMENTS, by F. H. Coensgen, W. F. Cummins and others. 13p.

UCRL-9714 $2.25

Lawrence Radiation Lab., U. of California, Berkeley.
TWO-NUCLEON TRANSFER REACTIONS IN THE LIGHT ELEMENTS, by Joseph Cerny III. Rept. on Contract W-7405-eng-48. May 61, 107p.

LA-2549 $0.50

Los Alamos Scientific Lab., N. Mex.
FORMATION OF UNIFORMLY CHARGED CONDUCTING DROPLETS AND POSSIBLE PROPULSION APPLICATIONS, by M. M. Hoffman. Rept. on Contract W-7405-eng-36. Sep 61, 25p.

LAMS-2619 $1.00

Los Alamos Scientific Lab., U. of California, N. Mex.
LASL CONTROLLED THERMONUCLEAR RESEARCH PROGRAM. Quarterly status rept. for period ending 20 Aug 61, on Contract W-7405-eng-36. Sep 61, 44p.

LAMS-2573 $0.50

Los Alamos Scientific Lab., N. Mex.
MECHANICAL QUADRATURE AND THE TRANSPORT EQUATION, by Bengt G. Carlson and Clarence E. Lee. Rept. on Contract W-7405-eng-36. Aug 61, 13p.

AD-261 438 $5.60

Maryland U., College Park.
THE CONFIGURATION AVERAGE OF THE GROUND STATE ENERGY OF AN ISOTOPICALLY DISORDERED LATTICE, INCLUDING THE CONTRIBUTION FROM CUBIC AND QUARTIC ANHARMONIC TERMS IN THE POTENTIAL ENERGY OF LATTICE. APPLICATION TO A LINEAR CHAIN AND THE PARTICULAR CASE OF A HYDROGEN-DEUTERIUM MIXTURE, by Rosemary A. Coldwell-Horsfall and Alexei A. Maradudin (Westinghouse Research Labs.). Rept. on Contract AF 49(638)399. July 61, 54p. 10 refs. Dept. of Physics Technical rept. 219; AFOSR 1165.

DESCRIPTORS: *Isotopes, Hydrogen, Deuterium, Helium, *Lattices, Thermodynamics, *Crystals, *Solid state physics, Cryogenics, *Brillouin zones, Mathematical analysis, Radioactive isotopes, Series.

Deviations from the laws of perfect solutions have been observed in mixtures of light isotopes such as H_2 - D_2 and He^3 - He^4 mixtures. The free energy of the disordered state appears to be always greater than that of the pure isotopes so that phase separation occurs below a certain critical temperature. An expression is obtained for the configuration average of the ground state energy of an isotopically disordered lattice, taking into account the cubic and quartic anharmonic terms in the expansion of the potential energy of the lattice in powers of the nuclear displacements. The result is applied to the case of a linear chain and the difference is calculated between the ground state energy of a disordered linear chain and that of the separated components, for the particular case of an equimolecular mixture of hydrogen and deuterium. The calculation is carried out to second order in the parameter μ which represents the deviation of the isotopic masses from the mean mass of the lattice. (Author)

AD-260 005 $4.60

National Research Labs., Ottawa (Canada).
AN INVESTIGATION OF FREE PISTON COMPRESSION OF SHOCK TUBE DRIVER GAS, by R. J. Stalker. May 61, 41p. 4 refs. Mechanical engineering rept. MT-44; NRC no. 6355.

DESCRIPTORS: *Shock tubes, Canada, Gas discharges, Shock waves, Compression shock, Gas flow, Heating, *High pressure compressors, High pressure research, Aerodynamics, Helium, Hydrogen, Design, Tests.

An analysis is made of the performance to be expected from a shock tube in which the driver gas is heated by isentropic compression with a free piston. It is found that high shock Mach numbers can be produced, and this is borne out by experiments. Consideration is also given to the use of this technique to heat driver gas for use in "tailored interface" operation of a shock tunnel, and it is found that the driver gas pressure can be maintained suitably constant for periods of time expected to be of practical use. (Author)

TID-13388 $4.60

New Mexico U., Albuquerque.
STRAIN DISTRIBUTION IN A THIN CIRCULAR DISK, by F. H. Mathews and R. Dove. July 61, 50p.

ORNL-3162 $0.75

Oak Ridge National Lab., Tenn.
STABILITY OF PLASMAS AGAINST ELECTROSTATIC PERTURBATIONS, by T. K. Fowler. Rept. on Contract W-7405-eng-26. 26p.

AD-260 648 $9.10

Plasmadyne Corp., Santa Ana, Calif.
AN EXPERIMENTAL INVESTIGATION OF THE BEHAVIOR OF AN ARC POSITIVE COLUMN IN THE PRESENCE OF FORCED CONVECTION, by Paul G. Thiene, James E. Chambers, and Woldemar v. Jaskowsky. Rept. on Contract AF 49(638)334. 29 Apr 61, 107p. 13 refs. Rept. no. T-4TN031-334; AFOSR-682.

DESCRIPTORS: *Electric arcs, Photographic analysis, *Enthalpy, *Gas flow, Gases, Argon, *Magnetohydrodynamics, *Plasma physics.

An experimental investigation has been made of the behavior of low-current arc positive columns in the presence of subsonic, laminar forced convection. Columns in argon at atmospheric pressure were drawn between collinear electrodes and deflected by convection normal to the interelectrodes axis. Photographs of deflected columns over a current range 2 to 6 amperes for various incident convection velocities up to approximately 200 cm/sec were taken and analyzed. The results are compared with theoretical predictions. In addition, a cursory investigation was conducted into the effect of a magnetic field applied transverse to the column so as to oppose the forced convection. (Author)

MATT-Q-14 $1.00

Plasma Physics Lab., Princeton U., N. J.
QUARTERLY REPORT COVERING THE PERIOD 1 JANUARY-31 MARCH 1961. Rept. on Contract AT(30-1)-1238. May 61, 36p.

SC-4637(RR) $0.50

Sandia Corp., Albuquerque, N. Mex.
THE HUGONIOT EQUATION OF STATE OF 6061-T6 ALUMINUM AT LOW PRESSURES, by C. D. Lundergan. Sep 61, 18p.

TID-13651 $2.60

Syracuse U. Research Inst., N. Y.
PERTURBATION SOLUTION OF A CLASS OF AXI-SYMMETRICAL SHELLS SUBJECTED TO A UNIFORM PRESSURE, by K. N. Tong. Annual rept. on Contract W-7405-eng-26. July 61, 24p. ME790-617A.

Acoustics

NYO-2573 $4.60

Aeroprojects Inc., West Chester, Pa.
APPLICATIONS OF ULTRASONIC ENERGY. TASK 1: CHEMICAL PROCESSING. TASK 2: METAL AND CERAMIC POWDER PROCESSING. TASK 3: ULTRASONIC INSTRUMENTATION. Progress rept. no. 19, 1 Dec 59-31 Jan 60, on Contract AT(30-1)-1836. Mar 60, 43p.

NYO-2574 $2.60

Aeroprojects Inc., West Chester, Pa.
APPLICATIONS OF ULTRASONIC ENERGY. TASK 1: ULTRASONIC CHEMICAL PROCESSING. TASK 2: ULTRASONIC METAL AND CERAMIC POWDER PROCESSING. TASK 3: ULTRASONIC INSTRUMENTATION. Progress rept. no. 20, 1 Feb 60-31 Mar 60, on Contract AT(30-1)-1836. Apr 60, 28p.

SCTM-37-61(73) $1.60

Sandia Corp., Albuquerque, N. Mex.
METHODS AND CONCEPTS IN ACOUSTICAL ENVIRONMENTAL TESTING, by R. I. Butler. Feb 61, 16p.

Electricity and Magnetism

AD-262 261 repriced $1.00

Naval Research Lab., Washington, D. C.
THE EFFECTS OF IRRADIATION ON MAGNETIC PROPERTIES OF ALLOYS AND FERRITES, by A. I. Schindler. 11 Aug 61, 40p. 11 refs. NRL rept. no. 5686.

DESCRIPTORS: Alloys, *Ferrites, Radiation damage, *Neutron bombardment, *Magnetic properties, Magnetic fields, Neutron diffraction analysis, Magnetic moments, Hysteresis, *Ferromagnetic materials, Metallic compounds, Oxides, Heat treatment, Magnetic materials.

Studies were made on the effects of neutron irradiation on the magnetic characteristics of metal alloys and ferrites. The magnetic properties included the coercive force, remanence, shape of the hysteresis loop, Curie temperature, and magnetic moment. Only the Curie temperature, was found to be relatively insensitive to neutron irradiation; all the other properties were modified by varying amounts. The radiation sensitivity of metal alloys and selected ferrites appears to be primarily related to the dependence of magnetic properties on the short-range ordering of the atoms along certain crystallographic directions. Materials which can be easily ordered show the greatest sensitivity. It has been found that the application of a magnetic field during irradiation can cause directional ordering to take place which in many cases produces more desirable magnetic characteristics. The studies of the ferrites are more complicated since the effects appear to be related to atomic displacements as well as possible radiation induced oxidation. This has been deduced from magnetic measurements of irradiated samples coupled with neutron diffraction data of the same material. (Author)

UNM-TR-EE-51 $8.60

New Mexico U. Engineering Experiment Station, Albuquerque.
MEASUREMENT OF LOW LEVEL MAGNETIC FIELDS UTILIZING THE HALL EFFECT, by W. W. Grannemann and Jerrel R. Lochner. Technical rept. June 61, 95p.

Electronics

UCRL-6514 $1.60

Lawrence Radiation Lab., U. of California, Livermore.
GETTERS OF GASES, A BIBLIOGRAPHY, by Carl J. Wensrich. Rept. on Contract W-7405-eng-48. July 61, 13p.

UCRL-6541 $0.75

Lawrence Radiation Lab., U. of California, Livermore.
THE HISTORY OF ELECTRON-BEAM TECHNOLOGY, by Rointan F. Bunshah. Rept. on Contract W-7405-eng-48. July 61, 33p.

Molecular Physics and Spectroscopy

HW-69199 $1.60

Hanford Atomic Products Operation, Richland, Wash.
SPECTROCHEMICAL ANALYSIS OF HIGH PURITY PLUTONIUM FOR METAL IMPURITIES USING ANION EXCHANGE, by Roy Ko. Apr 61, 7p.

PB 158 115 $3.60

Mallinckrodt Chemical Lab., Harvard U., Cambridge, Mass.
THE MICROWAVE SPECTRUM OF ACETYL CHLORIDE, by K. M. Sinnott. [Rept. on Contract Nonr-1866(14). 1960] 33p. 18 refs; AD-245 890.

DESCRIPTORS: *Acetyl radicals, *Chlorides, *Microwave spectroscopy, Isotopes, Rotation, Methyl radicals, *Hyperfine structure, Mathematical analysis, Chemical bonds, Molecular rotation.

The microwave spectrum of ten isotopic species of acetyl chloride are reported. Internal rotation of the methyl group splits some of the rotational transitions into doublets in addition to the chlorine hyperfine

structure. Analysis of the internal rotation splitting gives a barrier to internal rotation of 1296 ±30 cal/mole. From the hyperfine structure, the chlorine nuclear quadrupole coupling constants for Cl^{35} along the C-Cl bond axis and perpendicular to the plane of symmetry of the molecule were determined to be -58.5 and 21.5 Mc, respectively. The corresponding values for Cl^{37} were -46.4 Mc and 17.2 Mc. These coupling constants have been interpreted to give information about the double-bond and ionic character of the C-Cl bond. (Author)

AD-261 264 $6.60

Ohio State U. Research Foundation, Columbus.
A STUDY OF THE TOTAL ABSORPTION NEAR 4.7μ BY TWO SAMPLES OF CO, AS THEIR TOTAL PRESSURES AND CO CONCENTRATIONS WERE INDEPENDENTLY VARIED, by David Alexis Gryvnak (Master's thesis) and Dudley Williams. Scientific rept. no. 2 on Contract AF 19(604)6141. June 61, 67p. 5 refs. RF Proj. 1055; AFCRL-679.

DESCRIPTORS: Gases, *Carbon compounds, Monoxides, Absorption, Pressure, *Infrared spectroscopy, Atmosphere, Spectrographic analysis

Spectra of the 4.7μ band of CO were obtained after the radiation had passed through two cells containing mixtures of CO and N_2. The total pressure and CO concentration of the first cell were adjusted so that the absorption by it essentially lay in the "square root region" where the absorption is approximately proportional to the square root of the total pressure and Co concentration. Spectra were then obtained as the total pressure and CO concentration in the second cell varied over a wide range. (Author)

Solid State Physics

AD-258 594 repriced $0.50

Metals and Ceramics Lab., Wright Air Development Div., Wright-Patterson AFB, Ohio.
THE APPLICATION OF COMPUTER TECHNIQUES TO PREFERRED ORIENTATION STUDIES, by J. R. Holland. Rept. for Jan-June 60 on Metallic Materials. Dec 60, 19p. 3 refs. WADD Technical note 60-242.

DESCRIPTORS: *Crystal structure, Crystals, *Metallic crystals, *X-ray diffraction analysis, *Programming, Computers, Digital computers, Copper compounds, Solid state physics, Mathematical analysis.

A computer technique for plotting normalized pole figures is described and an illustration of the technique applied to data generated using Schulz reflection x-ray diffraction geometry is presented. The computer method enhances the accuracy of the x-ray data and is far less tedious than the usual manual methods of plotting normalized pole figures. Somewhat modified programs should be capable of utilizing data generated by other diffraction geometries commonly used in quantitative preferred orientation studies, thus the method is more versatile than a specialized, completely automatic pole figure plotter. (Author)

TID-13585 $11.00

Notre Dame U. Coll. of Engineering, Ind.
OPTICAL AND MECHANICAL PROPERTIES OF ALKALI HALIDE CRYSTALS. Final rept. 1 Feb 59-28 Feb 61 on Contract AT(11-1)-731. Sep 61, 140p.

PB 181 037 $0.50

Williams, Clyde, and Co., Columbus, Ohio.
ORGANIC SEMICONDUCTORS: THEIR TECHNOLOGICAL PROMISE. Rept. on Contract CC 4569. [1961] 20p. 21 refs.

DESCRIPTORS: *Semiconductors, *Organic materials, Technological intelligence.

A survey of the recent literature and the state-of-the-art.

Thermodynamics

ANL-6400 $2.25

Argonne National Lab., Ill.
AN EXPERIMENTAL INVESTIGATION OF HIGH-FLUX FREE CONVECTION HEAT TRANSFER TO WATER UP TO NEAR-CRITICAL CONDITIONS, by Vernon E. Holt. Rept. on Contract W-31-109-eng-38. Aug 61, 114p.

BNL-684(T-231) $0.50

Brookhaven National Lab., Upton, N. Y.
HEAT TRANSFER STUDY OF COBALT-60 SHIPPING CONTAINER, by L. B. Adler. Progress rept. no. 2. June 61, 13p.

GAMD-788 $1.60

General Atomic, San Diego, Calif.
A THERMAL MOCK-UP OF AN IRRADIATION CAPSULE, by L. D. Palmer. Project no. 32 under Contract AT(04-3)-314. 12 May 59, 13p.

TID-13078 $7.60

Institute of Engineering Research, U. of California, Berkeley.
PRESSURE GRADIENTS AND HEAT TRANSFER IN FORCED CONVECTION BOILING OF SUBCOOLED WATER, by W. L. Owens and V. E. Schrock. June 61, 71p.

TID-13205 $1.60

National Bureau of Standards, Boulder, Colo.
THE CRYOGENIC ASPECTS OF PROJECT SHERWOOD. Progress rept. no. 3, 1 July-30 Sep 60, 20p.

NBS-6737 $2.60

National Bureau of Standards, Boulder, Colo.
THE CRYOGENIC ASPECTS OF PROJECT SHERWOOD. Progress rept. no. 4, 1 Oct-31 Dec 60, 21p.

NBS-6761 $1.60

National Bureau of Standards, Boulder, Colo.
THE CRYOGENIC ASPECTS OF PROJECT SHERWOOD. Progress rept. no. 5, 1 Jan-31 Mar 61, 15p.

NBS-6784 $1.60

National Bureau of Standards, Boulder, Colo.
THE CRYOGENIC ASPECTS OF PROJECT SHERWOOD. Progress rept. no. 6, 1 Apr-30 June 61, 13p.

PB 155 892 $2.60

Naval Radiological Defense Lab., San Francisco, Calif.
THERMAL PROPERTIES OF MOLYBDENUM BETWEEN 2700°R AND 4000°R, by R. L. Rudkin. 20 June 60, 22p. 7 refs. Research and development technical rept. USNRDL-TR-433.

DESCRIPTORS: *Molybdenum, *Refractory materials, *Thermodynamics, Resistance, Conductivity, High temperature research.

The thermal properties of molybdenum have been measured from 2700°R to 4000°R using a resistance heated 10 mil wire suspended in a vacuum. The total hemispherical emittance was found to vary from 0.27 at 2700°R to 0.33 at 4000°R. The heat capacity values were 0.08 (BTU lb_m^{-1} $^oR^{-1}$) at 2700°R and 0.098 (BTU lb_m^{-1} $^oR^{-1}$) at 4000°R. The thermal conductivity was linear over this temperature range, changing from 62 to 55 (BTU $hr^{-1}ft^{-1}$ $^oR^{-1}$). The product of the thermal conductivity and the electrical resistivity divided by the absolute temperature was nearly constant and was about 10 percent higher than the value predicted theoretically for metals.

SCNC-317 $2.50

Sylvania-Corning Nuclear Corp., Bayside, N. Y.
THE EFFECT OF SOLID SOLUTION ADDITIONS ON THE THERMAL CONDUCTIVITY OF UO_2, by Richard M. Powers, Yolanda Cavallaro and Joseph P. Mathern. Rept. on Contract AT-30-1-GEN-366. Nov 60, 128p.

RESEARCH METHODS, TECHNIQUES AND EQUIPMENT

PB 150 196 $8.60

California U., Berkeley.
A SYSTEM FOR ANALYZING RUSSIAN TEXTS, by Sydney M. Lamb, Alfred B. Hudson, and C. Douglas Johnson. Rept. on Machine Translation Project, sponsored by National Science Foundation. July 60, 93p. 12 refs.

DESCRIPTORS: *Machine translation, Language, Coding, Computers, Reading machines, *Data processing systems.

Two approaches to the use of texts in MT research are in use today, the popular trial translation approach and the linguistic analysis approach. The former is of doubtful value since it is wasteful and leads to unreliable results. A detailed description of the latter is given. It is based upon a theoretical framework of structural levels, on each of which are linguistic elements having various relationships to one another. The system incorporates a scheme of segmentation of the linguistic material into optimum units to serve as lexical items, or lexemes, and a simple mnemonic grammar code for specification of syntactic properties of the lexemes. The analysis sheets prepared according to the system show the results of the following operations: (a) graphemic coding for IBM equipment of Cyrillic and non-Cyrillic material. (b) segmentation into lexes (i. e. graphemic representations of lexemes), (c) assignment of syntactic code symbols, and (d) determination of the preferred translation for each sentence and assignment of each of its features (including order changes) to individual lexemes. The results of the analysis are put on IBM cards and are run through various types of manipulation to provide organized lists of examples (each with its environment) of items which require investigation. (Author)

PB 158 358 $3.60

Diamond Ordnance Fuze Labs., Washington, D. C.
DOFL FIRST READER, by J. Rabinow. 26 Nov 54, 33p. Technical rept. no. TR-128.

DESCRIPTORS: *Reading machines, Design, *Data processing systems, Operation, Circuits, Typewriters, Printing.

The rapid development of information handling machines and their application to Government and business record keeping necessitates the design of devices to transcribe printed and typed matter into forms suitable for machine processing. Examples of such operations are: the issuance and redemption of checks by the U. S. Government and industry; the inventory records of business and industry; stock control by the armed services; and the automatic handling of mail. The art of automatic character recognition is quite old but only recently have successful experimental models been made. One such device has been completed and is capable of recognizing characters typed on an ordinary typewriter. The first model was built as an experiment and not for any particular application. Many improvements suggested themselves as the work progressed and it is believed that, by using the principles of this machine, high speed readers can be built capable of recognizing characters at rates in the range of 100 to 1000 characters per second. The output of such machines could be fed directly into computers, punchcards, magnetic tapes, sound reproduction devices, and secondary printers. (Author)

PB 155 367 $8.10

Stanford Research Inst., Menlo Park, Calif.
GRAPHICAL DATA PROCESSING RESEARCH STUDY AND EXPERIMENTAL INVESTIGATION, by A. E. Brain, A. Macovski and others. Quarterly progress rept. no. 2 on Contract DA 36-039-sc-78343. Nov 60, 88p. 118 refs. Rept. no. 2; SRI Proj. 3192; AD-249 873.

DESCRIPTORS: *Data processing systems, Military requirements, *Documentation, Data storage systems, *Identification systems, Aerial photographs, Video networks, *Military research.

Contents:
Application of the techniques of graphic arts and their electronic equivalent to the simplification of input data - the use of video processing methods for converting continuous-tone pictures to edge detail
A survey of pattern-recognition techniques
Construction of a small parallel-connected pattern-recognition machine for feasibility studies
Mathematical studies - the possible application of certain theorems of integral geometry
Data storage and retrieval in relation to the special problems of non-alphanumerical graphical data processing - the classification and indexing of aerial photographs

SOCIAL SCIENCES

TID-4025 (1st Rev.) (Pt. II) $2.75

Office of Technical Information Extension, Atomic Energy Commission, Oak Ridge, Tenn.
TRANSLATION TITLE LIST AND CROSS REFERENCE GUIDE. Part II. Subject index. Aug 61, 174p.

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SERVE THE BUSINESS COMMUNITY

The Department of Commerce maintains Field Offices to enable the business community to avail itself locally of Government facilities designed to promote commerce. Working closely with various units in the Department and, when necessary, with other Government agencies, the Field Offices provide business services to manufacturers, wholesalers, retailers, trade publications, trade associations, advertising agencies, research groups, financial institutions, and exporters and importers.

Experienced personnel will gladly assist in the solution of specific problems, explain the scope and meaning of regulations administered by the Department, and provide practical assistance in the broad field of domestic and foreign commerce. Field offices act as official sales agents of the Superintendent of Documents, and maintain an extensive business reference library containing periodicals, directories, publications and reports from official as well as private sources.

Among the many services which businessmen have found of value are:

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- Management and business aids
- Establishing a new business

BASIC ECONOMIC DATA

- Census data, with national and often State and regional breakdowns, on manufacturing, wholesaling, retailing, service industries, employment and unemployment, population, housing, agriculture
- Basic records of national income and product, regional trends, balance of payments, foreign aid

MARKETING AND DISTRIBUTION

- Development and maintenance of markets
- Distribution channels, facilities and services
- Marketing and distribution statistics

PRODUCTION

- Modernization of plant processes and other technological aids
- Development of new products
- Government-owned patents for free license
- Commodity standards

FOREIGN TRADE AND INVESTMENT

- Tariff and exchange regulations
- Import and export quotas, licensing regulations
- Statistics on imports and exports
- Investment and trade opportunities abroad
- Economic conditions in foreign countries

COOPERATIVE OFFICES

To make the services of the Department of Commerce more widely available, agreements have been entered into with more than 750 Chambers of Commerce, Manufacturers Associations, and similar business groups under which these organizations have become official Cooperative Offices of the Department. If specific information is not on hand in the Cooperative Office, your problem will be referred to the nearest Departmental field office.

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